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## CONTENTS

| | PAGE |
|---|---|
| Editorial Notes ... ... ... ... ... | 669 |
| Financial Stability in East Africa ... ... ... | 670 |
| The Development of the Persian Railways ... | 671 |
| Generous Praise and Two Warnings ... ... | 671 |
| Rheostatic Brakes for M.U. Stock ... ... ... | 672 |
| U.S.A. Railway Wages and Salaries ... ... | 673 |
| Letters to the Editor ... ... ... ... ... | 673 |
| The Scrap Heap ... ... ... ... ... | 675 |
| Overseas Railway Affairs ... ... ... ... | 676 |
| Publications Received ... ... ... ... | 677 |
| High-Capacity Tank Wagons ... ... ... | 678 |
| New Signalling at Glasgow Central, Scottish Region | 679 |
| Reconstruction of Chichester Station ... ... | 683 |
| Mobile Soil Testing Laboratory ... ... ... | 684 |
| Personal ... ... ... ... ... ... | 685 |
| New Equipment and Processes ... ... ... | 688 |
| News Articles ... ... ... ... ... ... | 690 |
| Contracts and Tenders ... ... ... ... | 693 |
| Notes and News ... ... ... ... ... | 693 |
| Railway Stock Market and Official Notices ... | 696 |

## Dangerous Precedent

WHEN asked by Lord Morrison of Lambeth in the House of Lords on November 30 when H.M. Government proposed to publish the report of the Stedeford Group, Lord Chesham, Joint Under-Secretary for the Ministry of Transport, said that the Group's recommendations would not be published, and that this had been made clear by the Minister when the Group had been set up and in subsequent statements. Pressed by Lord Morrison, who described the situation as "an extraordinary state of affairs," Lord Chesham said he did not think the matter in the least extraordinary, for it had been made perfectly clear by the Minister of Transport on April 13 this year, by his fellow Parliamentary Secretary on October 26, by Lord Mills on November 7, and by the Minister again on November 9 of this year. Also, the Group had not made a report—it had produced recommendations. Accustomed as we are becoming to the special use of words by the Minister of Transport—recently we learned that he makes a fine distinction between a "committee" and a "study group"—we find this latest example of hair-splitting at least as odd as did Lord Morrison, who expressed his surprise with a baffled, "Well, well!" His Lordship undoubtedly was speaking only metaphorically, for we are sure that, like ourselves, he considered the situation to be far from well. This culminating sauciness from the Ministry of Transport constitutes a precedent which could usher in a sinister future. The fact that a Minister says that a thing will not be published does not give him the right not to publish, nor does it make it right that the matter will not be published. Once a precedent of this kind has been allowed, there is no saying how far it could be taken. The whole thing carries with it a most unpleasant odour: exactly what is there in this report which makes its concealment by the Government so imperative? For unease of this kind, the Government has only itself to blame; unless there is publication, there will always be doubts as to how much was said and recommended by the Group and how much was introduced by another party. At the very least, the Minister's arrogant, unparliamentary, and entirely undemocratic high-handedness could help destroy confidence in the value of inquiry by an ostensibly independent authority.

## Unpopular All Round

ALTHOUGH we will not admit to any political bias, we are accustomed to Labour accusations of a Tory viewpoint, and admittedly we do not often find ourselves in agreement with official spokesmen of the Opposition's ideas. Nevertheless, we are at one with Mr. Francis Noel-Baker, Labour M.P. for Swindon, in his opinion expressed at Derby last Saturday that railwaymen at all levels were becoming "utterly disgusted at the Government's disgraceful dithering over the future of the railways." He added: "If this goes on much longer, British Railways will be in danger of disintegrating; and Mr. Marples will lose the services of some of the most experienced men at the top of the business—as well as of hundreds more drivers, firemen, and signalmen who will simply not tolerate more uncertainty about their future." The Government was apparently totally unable to find any way to carry out, by legislation, the "rash ultimatum" given to the Stedeford Committee for a drastic reorganisation of British Railways. The Minister's departure would not solve the problem, according to Mr. Noel-Baker. Maybe not, but it would ensure that a thumping good time would be had over Christmas by all connected with the railways.

## New Eurofima Loan

DURING October, Eurofima completed the flotation of a new loan for Sw. fr. 30 million, and was granted additional bank credits of Sw. fr. 6 million. With this money an order has been placed with Simmering-Graz-Pauker for 100 large two-axle covered wagons of 91 cu. m. (3,220 cu. ft.) capacity, for the account of the Austrian Federal Railways, and orders are about to be placed for about 200 standard wagons for the account of the Italian State Railways. The remainder of the money has been earmarked for motive power as detailed below, though at the moment the actual orders have not been signed: Portuguese Railways, Swiss-built electrical equipment for electric multiple-unit trains to be manufactured in Portugal; German Federal Railway, more V.100 diesel locomotives; French National Railways, more 040.DE diesel locomotives; Jugoslav Railways, more 040.DE diesel locomotives; Belgian National Railways, five more of the 2,100 b.h.p. diesel-electric locomotives; and Hellenic State Railways, some line-service diesel locomotives of a type yet to be chosen. All this stock is being allocated under hire-purchase agreements; and the comparative ease with which this recent loan was floated confirms the acceptance of Eurofima as a satisfactory investment by the European money market.

## Glasgow Central Re-signalling

THE new Glasgow Central signal box, replacing four existing boxes and due to come into operation shortly, shows what can be done with modern signalling methods. It is described in detail on page 679. Safety, of course, remains the overriding factor, but the keynote is flexibility of working, designed to cope with a very complex area, in which there are passenger working of all kinds, and a large number of engine and empty-carriage movements, some of them "propelling." Many lines are signalled for "both-ways" working, with such

success that in the crossing over the Clyde into the station it has been found possible to make six lines do the work of the former ten. This has had the important consequence that one of the two bridges over the Clyde, which had become due for renewal, can now be abandoned. Thus the heavy cost of a new bridge has been saved. The box, which is of the panel or console type, embodies several new features, all of which will add to flexibility.

## Rising Trend in Engineers' Salaries

THE rate of improvement in the incomes of professional engineers which has taken place in recent years is discussed in the latest Newsletter of the Engineers' Guild, which reports on the survey of salaries carried out by the Guild earlier this year. The report, which details the increases for all age groups and fields of employment, shows that the median income for all ages has risen by 32 per cent in the last four years. But it is not very clear whether the increases are merely in line with the general upward trend of incomes, or whether they indicate a relative improvement in engineers' economic standing. The conclusion drawn by the report is that the profession is in a stage of transition; the demand for young engineers has had a marked effect on salaries at this level and the range of incomes is becoming wider even in the lower age groups. Considerable variations are found to exist between the earnings of university graduates and non-graduates, and this is also likely to affect the income pattern as graduate entrants increase.

## Interlocking Signals by Electronic Circuits

ALTHOUGH the science of electronics has been applied to the remote-control and indicating elements of some signalboxes, until now the interlocking of points and signals has always necessitated mechanical locks or electrically-operated magnetic relays. A trial installation intended for completion by the middle of 1961 at Henley-on-Thames, British Railways, Western Region, using transistors, semi-conductor diodes, and ferrite cores, will become what is expected to be the first electronically-operated system of signal interlocking in the world. The apparatus is being developed by Mullard Equipment Limited on the basis of research suggested by Mr. A. W. Woodbridge, Chief Signal Engineer, British Transport Commission, and carried out at Imperial College, London. Its use may lead to important savings in maintenance costs. A description of the circuitry for a simple twin-track junction is given on page 688. The adoption of electronic interlocking for future signalling schemes will depend largely on its ability to surpass the outstanding reliability for this purpose of magnetic relays which can operate for a minimum of five years in a sealed box, and have a failure rate of only one in thousands of millions of operations.

## 100 Years of Service

THIS week, Messrs. Sandberg, the consulting, testing, & inspecting engineers of 40, Grosvenor Gardens, London, S.W.1, is celebrating its centenary. Founded by Christer Peter Sandberg in London in 1860, the firm has specialised in railway engineering from its inception, though the nationalisation of British Railways and subsequent loss of contracts caused it to widen its scope after 1948. One of the few firms of consulting engineers to possess its own laboratories, Sandberg specialises in consulting, testing, and inspecting in the fields of concrete metallurgy and welding. The firm's developments include the Sandberg sections, first brought out in 1878 and, as modified in 1894, generally adopted at that time; the sorbitic process for the heat treatment of rails, and the Sandberg oven, or controlled cooling, process, introduced for the prevention of cracks. This process has been particularly successful in America where, since its introduction, less than 10 transverse fissure failures in controlled cooled rails have been reported during the last 20 years.

## London Transport Laboratory

AN important addition to the resources of the railways was made by the official opening, earlier this week, of the Central Laboratory of London Transport. This laboratory, which is planned to house all the scientific staff of the Research Department and their equipment under one roof, was referred to in our issue of September 25, 1959, at the time its construction was commenced at Chiswick, and is illustrated elsewhere in this issue. The main feature of the laboratory is the wide variety of the work undertaken, not only in respect of the materials handled and the technique used, but also in its nature and purpose. The work is divided between five main sections and one sub-section, dealing respectively with physics and engineering, metallurgy, fuels and lubricants, chemistry, with textiles as a sub-section, and paints. One of the most important items of equipment installed is an axle-fatigue testing machine, designed to determine the strength of specimens of axle steel when subjected to rotating bending stress. It is intended initially to investigate the effects of surface rolling on fatigue strength, and later the effect of shrink fits.

## Passing Signals at Danger

THE collision, on April 25 last, between a freight train and a diesel passenger train, near Garforth on the Leeds-Hull line, provides yet another example of a driver's lapse. In this case the driver of the diesel train first passed an intermediate block signal at danger, and then failed to see the side and tail lamps of the freight train's brake van ahead of him in time to avert the collision. Colonel J. R. H. Robertson, whose report is summarised on page 690, places full and sole responsibility on this driver. Indeed, as well as reporting the circumstances to the Medical Research Council, he invited a member of the Council's Committee on Human Factors in Railways Accidents to attend the Inquiry and also to interview the driver in the presence of a representative of the driver's trade union. Colonel Robertson agrees that the installation of the Automatic Warning System on this line would have prevented the accident, but does not consider that the circumstances call for this line being given any special priority. But one would like to know if there is any medical explanation for these lapses on the part of drivers.

## Long Opening Bridges over Waterway

OCCUPYING a prominent position at the mouth of New York Harbour, Staten Island, though some 14 miles long and up to eight miles wide, has only one line of railway serving it. This is the Staten Island Rapid Transit subsidiary of the Baltimore & Ohio Railroad. To connect with the main system it has to cross Arthur Kill, a busy branch channel of the harbour. The crossing was effected in 1888 with a swing bridge, the longest then in existence. Even when it was demolished recently and replaced by a lift-span structure it was among the five largest of its type in the U.S.A. The span measured 496 ft. long and provided two 207-ft. navigation openings, but these were quite inadequate to pass the volume of shipping, including the largest tankers, now traversing the channel. Last year a new bridge was completed in replacement of the old one, and its lift-span provides a navigation opening of over 500 ft.; it is described in an article on another page. Being up to Coopers E.50 loading standard, it will carry 70-ton as opposed to only 50-ton wagons carried by the old bridge. With its 135-ft. headway the new 2,000-ton 558-ft. span enables the largest tankers and other ships to pass beneath.

## Financial Stability in East Africa

SIR JAMES FARQUHARSON, Acting Commissioner for Transport, East Africa, in seeking Central Legislative Assembly approval of the 1961 expenditure estimates of East African Railways & Harbours, describes the administration as "physically strong and financially healthy." After a slight decline in the first four months of the year, railway traffics have improved fractionally, and at the end of October the revenue at £16·44 million was £130,000, or 0·8 per cent above the 1959 level. In physical volume the goods traffic, in terms of ton-miles, for the first nine months has increased by 2·7 per cent, a smaller increase than the 4 per cent recorded for the whole of 1958 and 4·5 per cent for 1959. Despite the increase in the volume of goods traffic and the higher wages paid to various groups of staff, expenditure was only £119,000 (less than 1 per cent) above the corresponding period of 1959.

These results reflect great credit on the staff, especially when

account is taken of the difficulties under which the services have been operating for a substantial part of the year. This is acknowledged by Sir James Farquharson, but he believes that the future contains even more uncertainties than usual and it may prove very difficult to maintain the desired standard of financial health.

The estimates of revenue and expenditure were prepared some three months ago. The revised railways revenue for 1960 was then placed at £19·8 million. Sir James Farquharson is somewhat doubtful if this can now be achieved, but he expects that in so far as revenue falls below this level there will be a corresponding saving in expenditure, so that the net results for 1960 are likely to be practically identical with those for 1959. For 1961 the revenue is estimated at £20·2 million and it is hoped that East African economy will develop by a modest amount to provide this additional revenue.

In general, the railway services have operated satisfactorily throughout the year and all public demands have been met. Though the total freight load on the services has increased fractionally, the peak monthly demand was below the 1959 peak both on the Kenya & Uganda Line and also on the Tanganyika Central Line. A number of improvements has been made on passenger services throughout East Africa and further improvements are contemplated.

In referring to new projects, Sir James Farquharson explains that these are somewhat fewer than usual because the lack of buoyancy in earnings, the delicately balanced net revenue position, and the high cost of new capital makes it necessary to proceed with caution.

On the railways, in continuation of the policy of improving the permanent way on busier sections of line and at the same time releasing track material for building new extensions, provision is included in the 1961 programme to complete the final 50 miles of the re-laying of the line from Tanga to Moshi in new 60-lb. material at a cost of £668,000. There is also provision to lay a short section of 23 miles of the Magadi branch line in second-hand 80-lb track at a cost of £210,000; this will remove a short intermediate section of 50-lb. track between 95-lb. and 80-lb. material, and will allow a more satisfactory and economic operation of the Magadi branch with its heavy soda traffic. Hitherto, only light-axle locomotives have been able to operate on the branch because of this short section of light material. When the work is completed the new diesel-electric locomotives will be able to pass without restriction. Also the loading of larger covered bogie wagons can be increased by nearly four tons.

Although the new projects have been designed essentially to show a clear economic return by way of reduced expenditure, increased revenue on some operating or other net advantage, the programme is a progressive one and allows for steady development and improvement.

## The Development of the Persian Railways

BRITISH work on the Persian Railways during the 1939-45 war was the subject of two articles in our issues of February 2 and 16, 1945. Their illustrations included a map of the system and profiles of the long 1-in-66 and even 1-in-35 gradients of the 860-mile main line from the Persian Gulf to the Caspian Sea and its two branches, Teheran-Mianeh and Garmsar-Shahrud.

The many and varied difficulties encountered and the results achieved by our Royal Engineer Transportation troops in the 15 months—December, 1941 to March, 1943—during which they were responsible for running most of this railway system were duly recorded. Chaos was prevailing when they took over; water supplies in this arid country were completely inadequate, half the engines and stock was laid up for want of maintenance and spare parts, trains booked to take 8½ hr. on a run were taking 15-24 hr., and engine crews were often 20-24 hr. at a stretch on the footplate. Usually one train ran each way daily.

With the aid of additional engines, stock, and plant the R.E.s increased annual locomotive repairs from 12 to 97, constructed new water supplies and generally improved matters so greatly that the volume of traffic moved from Bandar Shahpur on the Persian Gulf to Bandar Shah on the Caspian Sea—a measure which was vitally necessary to aid the Russians in their campaign—was increased eight-fold in this short space of time.

Early in 1943, the British handed over entirely to United States troops, who were poured into the country in thousands accompanied by 56 diesel-electric and 96 steam locomotives and quantities of materials and plant of all kinds. Thanks to the sound foundations laid by the Royal Engineers and to such vast reinforcements of men and supplies the Americans quickly improved matters still further and were soon able to deliver to the Russians an average of 5,400 tons of military supplies daily. The railway was therefore in good shape when control of the section of line south of Teheran was handed back by the Americans to the Persian Government at the end of June, 1945.

The hand-over included more than 250 locomotives, but unfortunately with the Americans went the flow of spare parts and their skilled personnel; consequently before long about half this stud was laid up awaiting repairs. The track also, especially on the sharply-curved mountain sections, was suffering from hard wear, and it was only with difficulty that the mounting volume of now-civilian traffic could be moved. Moreover, thanks to Mossadeq's policy and the cessation of exports of oil, the country's financial resources grew desperately low.

It was only when the present Shah returned to power that rational finance was resumed. A shelved seven-year economic development plan was revived and the United States agreed to lend the Persian Government $53 million until such time as finances could be stabilised. Of this sum, about $13 million was allotted to the railways, enabling diesel locomotives and parts to be purchased from America and Persian staff to be trained in U.S. workshops. By 1957, 70 diesels had been delivered, which was fortunate as both passenger and goods traffic was then increasing rapidly.

This increase was also met by re-laying the main line with heavier rails, the provision of semi-automatic signalling, considerably increased over-all speeds and more rapid stock turn-round. The faster speeds over the mountain sections were made possible by the diesels and particularly by their electric braking, and also by the use of air-braked and piped wagon stock.

Long waits by descending trains to allow brake-blocks to cool off were thus eliminated. Timetable improvement to increase the capacity of the single-track mountain sections scheduled a succession of loaded trains from the ports moving up to Teheran—and the plateau generally—by day, and successive trains of empty wagons descending to the ports by night.

Meanwhile, the lighter rails released from the main line were used to extend existing and lay new branches. One of the latter is being constructed to join up with the Pakistan North Western Railway at Zahidan or Mirjawa and another to link up with the Turkish railway system. So rapidly are Persia's trade and industry—notably oil, cement and agriculture—increasing, that serious consideration is being given to doubling sections of the main line, to installing fully-automatic signalling and to increasing wagon-carrying capacity.

## Generous Praise and Two Warnings

IN an article appearing on December 5 in a national newspaper, Mr. H. F. Brown, an American consulting engineer, had "nothing but praise" for British Railways' choice of electrification. His praise also covered the diesel locomotives he has seen in this country. Mr. Brown, who has served for 47 years on one of the busiest railways in the United States—the New York, New Haven & Hertford line—thinks the electrification already done in Britain to be excellent, for it can be adapted to differing conditions—the British Transport Commission must have made careful study of all new types of electric traction before it adopted the most modern form. Mr. Brown has one warning: he believes it is wasteful to make wholesale decisions to supplant steam by other forms of traction if sufficient numbers of modern steam locomotives are available. The steam locomotive should not be replaced before it is worn out—a mistake made in the modernisation of the railways of the United States, where it was now apparent that original claims made for diesels were unjustified when compared with the performance of modern steam locomotives.

In Britain, Mr. Brown has been particularly impressed with the Manchester–Crewe stretch of line where, on one of the most complex track arrangements that he has seen, he thought

the programme was going along as quickly as could be expected. The travelling public should have patience. Of the suburban services, he says: " If I were a Londoner, I should not apologise for them: I think they are excellent compared with what we have in the United States."

Mr. Brown's unbiassed opinion is interesting in view of the belief of British electrical manufacturers that any substantial cuts in railway modernisation and electrification will have serious repercussions on the national economy—particularly in the export field. Unless a stable market with the British Transport Commission is assured, the industry believes it will stand to lose a share of £200 million worth of overseas railway re-equipment contracts during the next five years. Widespread redundancies in the Midlands, Lancashire, and Scotland will also result, and there will be loss for companies which have spent approximately £15 million on special extension to plant and on research and development. Main anxiety centres on the export field: because of the Government's present attitude to railway modernisation, no major orders for stock and equipment have been placed during the last six months. The British Electrical & Allied Manufacturers' Association has pointed out that a thriving home market keeps down export costs, and that railway export progress depends almost entirely on the success and continuance of the standard-frequency a.c. 25-kV. system adopted by British Railways. " If this system is held up for political reasons, or is clouded over," says Mr. Stanley Steward, Director of B.E.A.M.A., " our exports will be hampered. Foreign customers will either suspect that the system is not worth while, or say that our firms don't have enough experience of it."

B.E.A.M.A. also maintains that changes in Government policy are affecting morale and losing key personnel—in this view, the association has the support of an outspoken member of the Labour Party, as is recorded elsewhere in this section. This is not all: because of delays, the cost of some equipment has risen by 20 per cent—a serious development for both our home and our export markets.

## Rheostatic Brakes for M.U. Stock

DEVELOPMENTS in the field of rheostatic braking during the past ten years have resulted in the application of this form of braking to multiple-unit trains to an increasing degree, both in Europe and in North America. The Metropolitan system in Rome introduced rheostatic braking on its 1,500-V. lines in 1952, and similar schemes have since been brought into operation in Berlin, Hamburg, and Lisbon. On the American continent, 450 coaches on the subway system in New York are equipped with rheostatic braking, and an experimental scheme has been in operation for two years on the lines of the Toronto Transit Commission. These facts are mentioned in the paper " Rheostatic Braking for Multiple-Unit Trains," by Mr. J. H. Cansdale and Mr. G. Collins, both of A.E.I., read at the meeting of the Institution of Locomotive Engineers in London this week. In this paper, the authors examine the various schemes which can be used for rheostatic braking, and give a detailed description of the installation developed for the Toronto Transit Commission trains.

The paper is prefaced by a discussion on the various aspects of mechanical braking, the basis of which is the dissipation of the kinetic energy of a train by conversion to heat energy through the friction between brake shoes and wheel treads. The technique of mechanical braking has been brought to a high pitch of reliability and efficiency, and improvements in braking systems are still being made. But certain inherent disadvantages exist, such as the cost and inconvenience of frequent renewals of brake shoes, the trouble caused by brake shoe dust on electric rolling stock, and the adverse affect on wheel treads associated with certain applications of non-metallic brake blocks.

As the real alternative to mechanical braking with its attendant difficulties, the authors commend electrical braking for electric and diesel-electric rolling stock. This type of braking, either by the regenerative or by the rheostatic method, has been adopted in many electric locomotive installations in the past, and its use, particularly in the rheostatic form, is now widely accepted as suitable for main-line electric and diesel-electric locomotives. For multiple-unit trains, the cost and complication of installing electrical braking in addition to a mechanical brake system has prevented its adoption on an extensive scale, but, as the result of recent developments, the situation is changing, and rheostatic braking is looked on with more favour throughout the world.

The schemes using series-wound traction motors for rheostatic braking are divided in two groups: those in which the motors are used as self-excited series generators, and those equipped with means to allow the motors to operate as separately excited generators. Of these, the former is the simpler method and has been satisfactorily applied on tramcars fitted with manual control, in which the progressive cutting-out of braking resistance is a comparatively easy matter. On multiple-unit stock the problem is magnified by the need for a large number of steps in the cutting-out process to obtain a smooth control of braking from a high speed, and by the fact that more than one equipment in a train has to be operated from a single control position. Also, the number of steps in braking control is governed by the necessity to limit the value of the notching peaks, which in turn depends on the maximum permitted generated voltage of the traction motor. It is of interest to note that improvements in motor design have reduced this limitation to a large extent by allowing generated voltages for braking of double, and in some cases nearly three times, the nominal motor voltage on power.

Although variations of the separate-excitation method exist, they all require some form of exciter for the motor fields. Additional equipment is therefore necessary; on the other hand, the control of braking effort by adjustment of the exciter field allows much lighter and less expensive control gear to be used than that associated with the brake resistance in series with the motors in the self-excited scheme.

On the Toronto scheme, which operates on the self-excited principle, the cars fitted with rheostatic braking were required to work in multiple with existing stock equipped with air brakes only. This meant that the existing arrangement of master controller and brake controller had to be followed, and the problem of designing a suitable equipment was further accentuated by a limit of 16 in. imposed for the available height of the undercar equipment. The equipment incorporates two motor-driven camshaft controllers, one for the purpose of setting up circuits for series and series-parallel operation under power and for rheostatic braking and direction selection, the other to regulate the resistance in the motor circuits for both acceleration and rheostatic braking. It has been possible to use the same sections of resistance for braking as for power, but as considerably more resistance is needed under braking conditions, extra resistors are provided for braking purposes only.

Because of the high loads and inertia of the motor-driven camshafts, the problem of ensuring precise movements of the camshafts received special consideration. This difficulty was met by including in the drive between motor and camshaft a Geneva-type mechanism, together with a number of interlocks. By this means, exact locating of the camshaft at the required notch positions is achieved, as well as effective starting and stopping of the camshaft motor. The arrangement also allows the camshaft to run through several notches as quickly as possible when required without time being wasted in braking the camshaft at each notch.

The brake controller is of the normal type for operating the electro-pneumatic and automatic air brakes on the train. It also controls the rheostatic brake system by means of an air-operated rheostat, which calibrates a notching relay controlling the movement of the motor driving the resistance camshaft. In this way the E.P. and the rheostatic braking efforts on the train are matched. Provision is also made to restrict the E.P. brake pressure on the rheostatic-braked cars while rheostatic braking is effective, and to allow the E.P. brake system gradually to take over the braking duty as the rheostatic brake effort diminishes with reduction of train speed. Another interesting feature is a device which automatically adjusts the rheostatic braking effort in accordance with the loading of the car. The apparatus is mechanically-actuated by bogie spring deflection. Arrangements are also made to use the heat generated in the braking resistors for train heating. Fans circulate air through the resistors and thence to the car interior.

Braking performance curves based on test results are included in the paper. They indicate the efficiency of the rheostatic brake, and particularly its superiority over the E.P. brake at the higher end of the speed range, both in the value and consistency of the braking effort achieved. A description is given of an improved scheme which has been evolved for

future applications. In this scheme a simplified power circuit is used, the circuit camshaft controller is replaced by E.P. contactors and reverser, and the braking camshaft controller is air-operated.

In conclusion, the authors discuss the possibilities of an "all-electric" power and braking equipment, wherein air-operated brakes would be completely eliminated.

This is an interesting idea, particularly when the brake system described in detail in the paper can be regarded as composed of four types of brakes, namely, electrical, electro-pneumatic, automatic air, and emergency. The authors suggest that, as far as can be foreseen at present, the trend will be towards rheostatic braking for all normal service braking, supplemented by an air-brake for emergency and holding purposes only. In some respects, the retention of an air system is advantageous, particularly where it is necessary to satisfy the requirements of E.P. control gear.

## U.S.A. Railroad Wages and Salaries

(*By a correspondent*)

HOT-foot on the September 23 article explaining the retrogression in the U.S.A. railroad position, there came news that the Pennsylvania Railroad was taking drastic action to reduce the number of employees and curtail paybill costs. The premier railroad of the States had an operating deficit for the first eight months of the year owing to a fall in traffic, aggravated by a strike of 20,000 shop workers. The recent policy of Congress in amending acts dealing with railroad retirement and unemployment insurance added over $100 million a year to the burden of pay-roll taxes imposed on the railway companies. In November last a cost-of-living clause in labour contracts advanced wages rates by 3 cents an hour at an annual cost of about $60 million.

Not content with these concessions, the unions pressed demands for further increases in wages and fringe benefits this year. Despite the opposition of the railroads, wages tribunals have awarded advances in remuneration without any regard to the downward trend of railway traffics or to the ability of the private companies to meet the cost. In consequence, the railroads appear to be faced with the gravest crisis in their history. The main cause of the emergency is made clear by a statement of the number of railroad employees and their remuneration for the years 1948 to 1959, which was published by the Bureau of Railway Economics, Association of American Railroads, in July.

The statement covers 128 classes of employees, ranging from 6,860 principal executives, with an average salary of $14,330 a year, and 8,300 divisional officers receiving $10,070, to general labourers earning $4,176. The total number of employees declined from 1,326,910 in 1948 to 815,470 last year—a decrease of 511,440 or 38 per cent. Salaries and wages, however, rose from $4,768·8 million to $4,986·3 million—an increase of $217·5 million, or 4·5 per cent. The average annual payment to an employee increased by $2,521, or 70 per cent, from $3,594 to $6,115.

The annual payments made to many of the train and engine staff are far above the general average. Indeed in some cases they are fantastic. Road passenger engine drivers, 5,160 in number, earned on an average $10,729 last year, more than a divisional officer's salary. Road freight engine drivers, more than three times the number of the passenger drivers, were paid $9,655. In contrast 4,930 yardmasters drew $8,840 apiece and 2,590 train dispatchers $8,030, though 990 chief train dispatchers received $9,450. Then 4,345 road passenger conductors earned $9,386, rather more than the average payment to 13,950 road freight conductors; their remuneration seems out of proportion to a payment of $7,656 to 2,015 supervisory station agents at major places.

In April, 1958, a Senate committee under the chairmanship of Mr. George A. Smathers, pointed out that a reappraisal of the railroad labour situation was necessary and urged that "railroad labour co-operate in proceedings designed to strengthen the economic position of the railroads." The Unions have rejected this advice and the plight of the railroads may become desperate by the end of 1960.

The 1959 report of the Illinois Central demonstrates the effect of mounting employment costs on a progressive railroad operating 6,500 miles in Mid-America. In 1949, total employment costs were $140,339,770; ten years later they were $159,286,050. The increase of nearly $19 million happened in spite of the employment of 12,270, or 31 per cent, fewer people and the investment of $247·5 million in capital expenditures, including the installation of 612 diesel units, which hold down train operating costs. Though freight revenue was up 2 per cent, operating expenses were 3 per cent higher, net income was 17 per cent less and dividends dropped to $2 per share for the first time in the past seven years.

Six months of 1960 brought a further 4 per cent fall in Illinois Central freight revenue, and earnings before charges were down nearly a third. Aggregate earnings of the 24 railroads in the Southern Region were $9·5 million lower, a decrease of 13·7 per cent. That compared with a disastrous fall of 35 per cent in the Eastern District and one of 19 per cent in the Western District. A state of emergency exists on the whole railway system and should rouse the Government to review the national transport policy without delay. Unions rejected this advice, but in May, 1959, the Insterstate Commerce Commission, when reporting on the railroad passenger train service deficit, said that "the railroad wage structure, including work rules and certain full-crew laws, may involve uneconomic use of labour" and added that comprehensive review of labour-management relations was required. These findings probably influenced the railroads and operating unions to agree on submitting the question of ancient work rules to a Presidential Commission.

Accordingly, on November 1, an executive order from Washington set up a study group of 15 members, representing railroad management, the operating trade unions and the public, to report not later than December 1, 1961, on "an emergency affecting the national interest." The continuance of the U.S.A. railroads as private enterprises may depend largely on the ability of the study group to frame proposals which both parties will accept either voluntarily or under the stress of public opinion.

# Letters to the Editor

(*The Editor is not responsible for opinions of correspondents*)

## British Railways Attacked and Vindicated

November 30

SIR,—I was delighted to see your editorial exploding a correspondent's "blunderbuss" attack on British Railways, but rather sorry that you should have used some of the arguments which you did (some of which will not bear very close examination) while leaving untouched much more powerful ammunition kindly provided by Mr. Gregg himself.

For example, you have trotted out the rather hoary tag that British Railways are "the busiest in the world." This may or may not be so according to what one is meaning, but suffice it to say that line occupation on some of the main lines in Belgium, Germany, and Italy (and of course all over Switzerland (Federal Railways) which has the densest line occupation in trains per single track mile of any system in the world) is at least as great as on the comparable main lines here (and no benefit from a reduced Sunday passenger service) while it is on these very lines (e.g., Ruhr-Cologne-Frankfurt or Liege-Brussels-Ostend or Milan-Florence-Rome-Naples) that they run their especially fast trains.

Equally, you are on very unsure ground in suggesting that domestic labour is easily come by in France, for example, where full employment and high wages make French domestics impossible to get. In fact, France, Germany, Switzerland, and Scandinavia import their domestic help from Spain and Italy, just as we do from Ireland and Spain.

On the other hand, Mr. Gregg really can be exploded when he puts all our ills down to nationalisation. The railways with which he compares British Railways so badly (in his view) are not only nationalised, but in the case of Italy are actually a Government Department with all the staff civil servants. In France they are a public corporation like British Railways, but much more centralised.

Can you, Sir, or any reader, please explain why British Rail-

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the programme was going along as quickly as could be expected. The travelling public should have patience. Of the suburban services, he says: " If I were a Londoner, I should not apologise for them: I think they are excellent compared with what we have in the United States."

Mr. Brown's unbiassed opinion is interesting in view of the belief of British electrical manufacturers that any substantial cuts in railway modernisation and electrification will have serious repercussions on the national economy—particularly in the export field. Unless a stable market with the British Transport Commission is assured, the industry believes it will stand to lose a share of £200 million worth of overseas railway re-equipment contracts during the next five years. Widespread redundancies in the Midlands, Lancashire, and Scotland will also result, and there will be loss for companies which have spent approximately £15 million on special extension to plant and on research and development. Main anxiety centres on the export field: because of the Government's present attitude to railway modernisation, no major orders for stock and equipment have been placed during the last six months. The British Electrical & Allied Manufacturers' Association has pointed out that a thriving home market keeps down export costs, and that railway export progress depends almost entirely on the success and continuance of the standard-frequency a.c. 25-kV. system adopted by British Railways. " If this system is held up for political reasons, or is clouded over," says Mr. Stanley Steward, Director of B.E.A.M.A., " our exports will be hampered. Foreign customers will either suspect that the system is not worth while, or say that our firms don't have enough experience of it."

B.E.A.M.A. also maintains that changes in Government policy are affecting morale and losing key personnel—in this view, the association has the support of an outspoken member of the Labour Party, as is recorded elsewhere in this section. This is not all: because of delays, the cost of some equipment has risen by 20 per cent—a serious development for both our home and our export markets.

## Rheostatic Brakes for M.U. Stock

DEVELOPMENTS in the field of rheostatic braking during the past ten years have resulted in the application of this form of braking to multiple-unit trains to an increasing degree, both in Europe and in North America. The Metropolitan system in Rome introduced rheostatic braking on its 1,500-V. lines in 1952, and similar schemes have since been brought into operation in Berlin, Hamburg, and Lisbon. On the American continent, 450 coaches on the subway system in New York are equipped with rheostatic braking, and an experimental scheme has been in operation for two years on the lines of the Toronto Transit Commission. These facts are mentioned in the paper " Rheostatic Braking for Multiple-Unit Trains," by Mr. J. H. Cansdale and Mr. G. Collins, both of A.E.I., read at the meeting of the Institution of Locomotive Engineers in London this week. In this paper, the authors examine the various schemes which can be used for rheostatic braking, and give a detailed description of the installation developed for the Toronto Transit Commission trains.

The paper is prefaced by a discussion on the various aspects of mechanical braking, the basis of which is the dissipation of the kinetic energy of a train by conversion to heat energy through the friction between brake shoes and wheel treads. The technique of mechanical braking has been brought to a high pitch of reliability and efficiency, and improvements in braking systems are still being made. But certain inherent disadvantages exist, such as the cost and inconvenience of frequent renewals of brake shoes, the trouble caused by brake shoe dust on electric rolling stock, and the adverse affect on wheel treads associated with certain applications of non-metallic brake blocks.

As the real alternative to mechanical braking with its attendant difficulties, the authors commend electrical braking for electric and diesel-electric rolling stock. This type of braking, either by the regenerative or by the rheostatic method, has been adopted in many electric locomotive installations in the past, and its use, particularly in the rheostatic form, is now widely accepted as suitable for main-line electric and diesel-electric locomotives. For multiple-unit trains, the cost and complication of installing electrical braking in addition to a mechanical brake system has prevented its adoption on an extensive scale, but, as the result of recent developments, the situation is changing, and rheostatic braking is looked on with more favour throughout the world.

The schemes using series-wound traction motors for rheostatic braking are divided in two groups: those in which the motors are used as self-excited series generators, and those equipped with means to allow the motors to operate as separately excited generators. Of these, the former is the simpler method and has been satisfactorily applied on tramcars fitted with manual control, in which the progressive cutting-out of braking resistance is a comparatively easy matter. On multiple-unit stock the problem is magnified by the need for a large number of steps in the cutting-out process to obtain a smooth control of braking from a high speed, and by the fact that more than one equipment in a train has to be operated from a single control position. Also, the number of steps in braking control is governed by the necessity to limit the value of the notching peaks, which in turn depends on the maximum permitted generated voltage of the traction motor. It is of interest to note that improvements in motor design have reduced this limitation to a large extent by allowing generated voltages for braking of double, and in some cases nearly three times, the nominal motor voltage on power.

Although variations of the separate-excitation method exist, they all require some form of exciter for the motor fields. Additional equipment is therefore necessary; on the other hand, the control of braking effort by adjustment of the exciter field allows much lighter and less expensive control gear to be used than that associated with the brake resistance in series with the motors in the self-excited scheme.

On the Toronto scheme, which operates on the self-excited principle, the cars fitted with rheostatic braking were required to work in multiple with existing stock equipped with air brakes only. This meant that the existing arrangement of master controller and brake controller had to be followed, and the problem of designing a suitable equipment was further accentuated by a limit of 16 in. imposed for the available height of the undercar equipment. The equipment incorporates two motor-driven camshaft controllers, one for the purpose of setting up circuits for series and series-parallel operation under power and for rheostatic braking and direction selection, the other to regulate the resistance in the motor circuits for both acceleration and rheostatic braking. It has been possible to use the same sections of resistance for braking as for power, but as considerably more resistance is needed under braking conditions, extra resistors are provided for braking purposes only.

Because of the high loads and inertia of the motor-driven camshafts, the problem of ensuring precise movements of the camshafts received special consideration. This difficulty was met by including in the drive between motor and camshaft a Geneva-type mechanism, together with a number of interlocks. By this means, exact locating of the camshaft at the required notch positions is achieved, as well as effective starting and stopping of the camshaft motor. The arrangement also allows the camshaft to run through several notches as quickly as possible when required without time being wasted in braking the camshaft at each notch.

The brake controller is of the normal type for operating the electro-pneumatic and automatic air brakes on the train. It also controls the rheostatic brake system by means of an air-operated rheostat, which calibrates a notching relay controlling the movement of the motor driving the resistance camshaft. In this way the E.P. and the rheostatic braking efforts on the train are matched. Provision is also made to restrict the E.P. brake pressure on the rheostatic-braked cars while rheostatic braking is effective, and to allow the E.P. brake system gradually to take over the braking duty as the rheostatic brake effort diminishes with reduction of train speed. Another interesting feature is a device which automatically adjusts the rheostatic braking effort in accordance with the loading of the car. The apparatus is mechanically-actuated by bogie spring deflection. Arrangements are also made to use the heat generated in the braking resistors for train heating. Fans circulate air through the resistors and thence to the car interior.

Braking performance curves based on test results are included in the paper. They indicate the efficiency of the rheostatic brake, and particularly its superiority over the E.P. brake at the higher end of the speed range, both in the value and consistency of the braking effort achieved. A description is given of an improved scheme which has been evolved for

fu[illegible]ire applications. In this scheme a simplified power circuit [illegible]used, the circuit camshaft controller is replaced by E.P. [illegible]ntactors and reverser, and the braking camshaft controller [illegible]air-operated.

[illegible]n conclusion, the authors discuss the possibilities of an "[illegible]ll-electric" power and braking equipment, wherein air-[illegible]perated brakes would be completely eliminated.

This is an interesting idea, particularly when the brake system described in detail in the paper can be regarded as composed of four types of brakes, namely, electrical, electro-[illegible]eumatic, automatic air, and emergency. The authors suggest [illegible]t, as far as can be foreseen at present, the trend will be [illegible]wards rheostatic braking for all normal service braking, [illegible]pplemented by an air-brake for emergency and holding [illegible]rposes only. In some respects, the retention of an air [illegible]ystem is advantageous, particularly where it is necessary to [illegible]atisfy the requirements of E.P. control gear.

## U.S.A. Railroad Wages and Salaries

(*By a correspondent*)

HOT-foot on the September 23 article explaining the retrogression in the U.S.A. railroad position, there came news that the Pennsylvania Railroad was taking drastic action to reduce the number of employees and curtail paybill costs. The premier railroad of the States had an operating deficit for the first eight months of the year owing to a fall in traffic, aggravated by a strike of 20,000 shop workers. The recent policy of Congress in amending acts dealing with railroad retirement and unemployment insurance added over $100 million a year to the burden of pay-roll taxes imposed on the railway companies. In November last a cost-of-living clause in labour contracts advanced wages rates by 3 cents an hour at an annual cost of about $60 million.

Not content with these concessions, the unions pressed demands for further increases in wages and fringe benefits this year. Despite the opposition of the railroads, wages tribunals have awarded advances in remuneration without any regard to the downward trend of railway traffics or to the ability of the private companies to meet the cost. In consequence, the railroads appear to be faced with the gravest crisis in their history. The main cause of the emergency is made clear by a statement of the number of railroad employees and their remuneration for the years 1948 to 1959, which was published by the Bureau of Railway Economics, Association of American Railroads, in July.

The statement covers 128 classes of employees, ranging from 6,860 principal executives, with an average salary of $14,330 a year, and 8,300 divisional officers receiving $10,070, to general labourers earning $4,176. The total number of employees declined from 1,326,910 in 1948 to 815,470 last year—a decrease of 511,440 or 38 per cent. Salaries and wages, however, rose from $4,768·8 million to $4,986·3 million—an increase of $217·5 million, or 4·5 per cent. The average annual payment to an employee increased by $2,521, or 70 per cent, from $3,594 to $6,115.

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Can you, Sir, or any reader, please explain why British Rail-

ways should constantly be attacked for being too large and over-centralised to work properly, while the pre-war Deutsche Reichsbahn (before the East-West German systems were separated by the division of Germany) was far larger and far more centralised and yet had the reputation of being go-ahead and efficient; or for that matter why nearly all those critics that blame "nationalisation" for our troubles, invariably use other nationalised railways as their examples of virtue!

Yours faithfully,

G. H. HAFTER

49, Church Street,
Old Isleworth, Middlesex

## Electrification of British Railways

November 10

SIR,—"Surprise and horror" were expressed by Sir Toby Low, Chairman of the Select Committee on Nationalised Industries which examined the working of British Railways, that the Ministry of Transport did not examine whether the use of diesel locomotives would have given a better financial return than the Euston–Manchester–Liverpool electrification in the London Midland Region.

Probably the best older authority on railway electrification schemes for this country is the Weir Committee report issued in 1931. That document represented the most authoritative statement of its time on railway electrification in Britain. It contained details of capital costs and annual net savings for two schemes: (*a*) the London & North Eastern Railway project extending from Kings Cross to Leeds; and (*b*) the London Midland & Scottish Railway scheme for conversion from Crewe to Carlisle, Windermere, and Liverpool, and including several small subsidiary lines.

The figures given showed an estimated net capital outlay of £8,646,000 and £5,123,000 respectively for the L.N.E.R. and L.M.S.R. projects, with respective percentage returns of 7·23 and 2·5, contributing to a total return of 5·45 per cent on a total capital outlay of £13,768,000.

The marked difference in returns may be attributable to the fact that it was found that there was no return below about 1,750,000 trailing ton-miles/track-miles per annum beyond which the yield would progressively increase. The Weir Committee estimated the capital cost of electrifying all standard-gauge steam-operated railways in Great Britain at £260·87 million, this figure to include all attendant expenditure such as track equipment and new sheds, shops, stores, and so on. The committee further found that the percentage return was inversely proportional to capital cost per track-mile, and that the point at which no return would be gained was equivalent to about £7,000 capital cost per track-mile. Although the figures for 1931 do not apply today, the same principles should be valid with adjustment for increased prices and other values.

The report of the Select Committee on the Nationalised Industries envisaged a 5 per cent return on a total net capital cost of £161 million in connection with the Euston–Manchester–Liverpool electrification scheme, and pointed out that this percentage would include increased passenger receipts. These had been discounted by the Weir Committee. The report added that the Ministry of Transport believed the scheme would cost appreciably more than £161 million and that revenue improvements from diesel traction would be gained more quickly than those from new electrification.

On the same basis as the Weir Committee report, the percentage return on this electrification is 3·1. If this electric scheme is justified in preference to other methods of traction does this mean that the return on diesel traction by either diesel locomotives or by diesel railcars is less than 3·1 per cent? If so, the economy of the vast expenditure on diesel traction is most delicately balanced, and the relative economic merits of other forms of traction should have been more critically investigated. On the other hand, if the Ministry view proves correct, the return on the electrification scheme would be even lower than 3·1 per cent, and still more delicately poised, which means that only a slight change in traffic density, fares, or other factors would seriously disturb its economy.

Annual energy consumption for the London Midland electrification scheme has been estimated at 640 kWh. Assuming 50 Wh. per trailing ton-mile, this would give 12,800 million trailing ton-miles per annum which, on 1,780 single-track-miles, would produce a traffic density of 7,200,000 trailing ton-miles per single-track-mile per annum, which is substantially greater than the traffic densities of the L.N.E.R. and L.M.S.R. schemes and the average national value for the Weir Report.

At a net capital cost of £161 million, this is equivalent to £90,600 per single-track-mile, and thus 18 times greater than the net capital cost per track-mile assumed for the Weir national estimate. What has happened in the meantime, to cause the net capital cost to soar to such astronomical heights?

The 25-kV. 50-cycle system requires many improvements to the existing system, some of which would have to be carried out whether the line was electrified or not. It should not be impossible to separate the various works undertaken to give a more accurate presentation of the true cost of electrification.

Assuming that the net capital expenditure and working costs given in the Weir report have increased in approximately similar proportions for the Euston–Manchester–Liverpool scheme, then the expected return on this scheme for the high traffic density of 7,200,000 trailing ton-miles per track-mile obtaining would be of the order of 8/8·5 per cent. Yet the return given above is only 3·1 per cent, which means either that the net capital cost has greatly increased or that net savings have greatly decreased. Some explanation is needed on the various factors which may have influenced such a wide disparity.

Although the £161 million may include works which would be necessary irrespective of the method of traction used, it would be expected that each scheme would be assessed in reference to its own return on the capital expended. It is, therefore, all the more difficult to understand the low overall return on the scheme as a whole.

Regarding price of electrical energy, it is possible that the Generating Board would supply in bulk to the B.T.C. without going through the Area Boards but with due regard to transmission and distribution costs. At the coal price prevailing when the scheme was under consideration the average energy cost resulted in 0·75d. per kWh., representing only 50 per cent increase over the value taken by the Weir Committee.

In addition, the increased number of grid points near the line of route today as compared with that of 1931 would lead to a more economic overall design of the traction-supply system. Electrical energy price considerations would appear to point towards a higher return than that given, for its cost has risen only slightly compared with that of other commodities during the period intervening between the publication of the Weir report and the present.

While the advantages of electrification are well known, this form of traction has its disadvantages. The failure of an individual diesel locomotive has less wide repercussions on the system as a whole than the failure of a multiplicity of electric locomotives which would result from failure of the energy supply. Diesel locomotives can be designed for use on all lines of British Railways, whereas electric locomotives are limited to the electrified sections. This limitation necessitates the selection of a high-density traffic section for the application of electrification.

It is estimated that the capital cost of an electric locomotive is only about 50 per cent of that of a diesel-electric locomotive of a given h.p.; but to this must be added the capital costs of electrical transmission, distribution, and control. While I do not know at what price diesel fuel is supplied, it may be that there is a slight advantage over the electric scheme in thermal value of power output delivered per 1d.

It may be that the view of the Select Committee is correct that diesel traction may prove more economical, and that conversion to this form of traction could be done more rapidly. While this may be so, an important attribute of electrification is that it employs indigenous coal, and from certain aspects it is becoming more vital to make use of this home-produced energy.

To resolve these difficulties, what is required is a statement from the British Transport Commission on the general lines of the Weir report referring to (*a*) electrification and (*b*) diesel haulage. This would enable interested parties to form a correct view of the situation. It is up to the Minister to take the necessary action—the preparation of such a statement should be directed by the Ministry of Transport itself.

Yours faithfully,

S. B. JACKSON

47, Christchurch House,
Streatham Hill, London, S.W.2

# THE SCRAP HEAP

### Cold Comfort

According to our Edinburgh correspondent, the Caledonian Railway has issued orders that no fires are to be lit in its waiting rooms. However shareholders south of the Tweed may appreciate this novel form of economy in coal consumption, it will prove cold comfort for those who are obliged to patronise the stations. Even the South-Eastern has not gone to this extreme—yet.—*From "The Financial Times," November* 22, 1900.

### Railway Relics

Illustrated on this page is the Devonshire Street entrance of the former Globe Road & Devonshire Street station of the Great Eastern Railway, now known as Bancroft Road. This station was opened in the mid-1880s, probably when the line was widened to four tracks, and closed some 40 years later. Other remains are visible in Globe Road in the shape of an old entrance gate with sign over, still bearing the full name of the station. On the north side of the railway at the east end is a pier with a cast iron lamp base, indicating another entrance or exit. Historically the site is important for the ceremonial inauguration of the first section of the Eastern Counties Railway between Devonshire Street and Romford on June 18, 1839. The actual point of departure was just east of Globe Road station by the entrance to Devonshire Street goods yard. This point was the Mile End Station shown in time-tables and maps of the 1840s and 1850s, which appears to have been closed about 1860. A map of the late 1880s indicates the "G.E. Railway Cab Department" as occupiers of a yard on the south side of the railway in Devonshire Street. The line and former Globe Road station here cuts across the old Globe Lane Chapel Burial Ground, most of which was bought by the railway company. In Globe Road, on the north side of the railway, the chapel remains as a clubroom, together with the last remnant of the burial ground, in which a few tombstones still remain.

*Great Eastern Railway sign at site of Globe Road station, up side, from Bancroft Road*

## Export Special

*Freight train of 40 wagons loaded with refrigerators and washing machines for Australia, from A.E.I. Limited Hotpoint factory at Peterborough*

### Cart before Horse?

The West Coast Railway connecting Georgetown with the right bank of the Essequibo River, in British Guiana, was constructed on the same pattern as the Demerara East Coast standard-gauge line, referred to in last week's issue, but rather curiously with 3-ft. 6-in. gauge. The reason for this is lost in history, but a clue may have been uncovered in Barbados. Although this island today does not possess a railway—it was scrapped long ago—there was a 3-ft. 6-in. gauge line there. It also appears that some 3-ft. 6-in. gauge locomotives and rolling stock were bought from Barbados, thus giving rise to the theory that the West Coast line was laid to a gauge suitable for these imported vehicles.

### The End of a Mogul

Number B.R. 58850, 0-6-0 Tank locomotive, the last of the North London Railway locomotives, known to their former drivers as the "Moguls," has been withdrawn from service. It was built at Bow Works in 1879 (Works No. 181) and went into service on the North London Line as No. 76, where it was used for shunting and freight train duties. It was re-numbered 116 in 1891 and rebuilt in 1897. In 1909 the locomotive was transferred to the L. & N.W.R. and again re-numbered 2650. On amalgamation, 2650 was re-numbered 7505, and in mid-1934 it was given yet another number, 27505. With the event of British Railways its number became 58850.

# OVERSEAS RAILWAY AFFAIRS

*(From our correspondents)*

## NIGERIA

### Track Improvement Programme

The Nigerian Railway Corporation is reported to be spending £6 million on improving the railway lines from Port Harcourt northwards to Kafanchan. The United States has approved a loan of £1,100,000 to the Nigerian Railway Corporation. A total of £10 million is to be spent in an overall track improvement programme which will extend over 599 miles of the Corporation's system. The United States loan will be used for the reconstruction of the lines between Enugu and Makurdi.

## SOUTH AFRICA

### Express Goods Services Extended

The express goods services operated by the South African Railways have been extended by the introduction of a service from Kaserne to Grahamstown via Port Elizabeth, for a trial period of six months. From Port Elizabeth the traffic to Grahamstown is by scheduled road transport on Mondays and Thursdays only. As it is impossible to confine the acceptance at Kaserne to specific days to make a direct connection, delivery cannot be guaranteed by the Railways within a certain time as on the other services. Instead, there is a guarantee that the goods will be available to Port Elizabeth on the third day after acceptance.

Express goods services are in operation between Durban, Cape Town, East London, Port Elizabeth and the Johannesburg—Pretoria area including several Reef stations, and are proving popular. The increasing tonnages recorded reveal that a definite need is being met. In the case of the Durban service, for example, an average of 334 tons is being carried each week compared with 129 tons during the first week after the introduction.

### New Rolling Stock

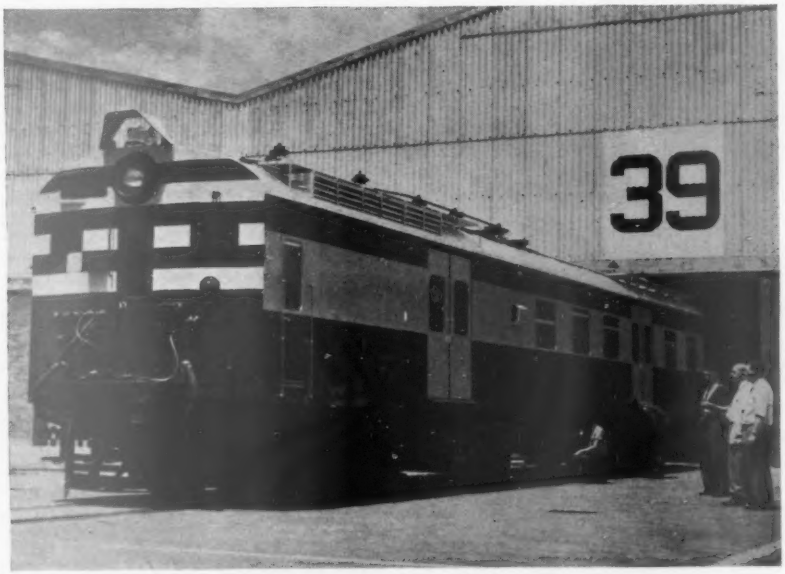
Sixteen electric locomotives Class "5E1," built by Associated Electrical Industries (Manchester) Limited, and 18 diesel-electric locomotives built by the International General Electric Company, were placed in service by the South African Railways during the third quarter of the year (July-September). In addition one dynamometer car was delivered by Credé & Company G.m.b.H. of West Germany and 79 caboose coaches by Union Carriage & Wagon Co. (Pty.) Ltd. of Nigel, Transvaal. During the three months under review, 1,218 goods vehicles were placed in service, including 381 short fruit trucks. Twelve passenger coaches and 902 goods wagons of various descriptions were withdrawn from service and scrapped.

### Gas Plant Completed

The new £350,000 gas-producer plant for supplying gas to the 79 gas furnaces in the workshops and foundries at Koedoespoort, largest mechanical workshops of the South African Railways, has been put into service. Because of the large number of furnaces used for heating metals, annealing castings, drying cores and moulds, and for various heat treatment purposes, a plant capable of producing 120 million B.T.U. per hr., was necessary. The plant consists of six rotary grate gas producers each with a capacity of 200 therms, an internal diameter of 10 ft., consuming 2,420 lb. of coal an hr. and giving a gas of heating value of at least 150 British thermal units per cu. ft. Each of the producers weighs approximately 70 tons.

### Distinctive Colour Scheme

Horizontal yellow and gulf red stripes painted on the ends of motor coaches and driving trailer-coaches of suburban passenger trains, and on the ends of guards' vans and passenger vans will be used by the South African Railways Administration to make passenger and goods trains more clearly visible than they are now. New coaches will be placed in service with the ends already painted in the distinctive colours while rolling stock already in service will be painted when the vehicles are shopped for repairs.




*Suburban passenger motor coach of the South African Railways, showing end painted in new colour scheme*

## RHODESIA

### Damage to Boom Barriers

In the first 16 days during which the new automatic protective booms were in operation at the Paisley Road level crossing in Salisbury the booms have been smashed by road vehicles on five occasions, all of them in daylight. The first was broken within two days, and apart from possible police action the Railways propose to recover the cost of repairs amounting to £11 7s. 3d. from the driver or owners of the lorry involved.

## INDIA

### Line Across Hasdee River

The Railway Board has sanctioned the construction of a broad-gauge line of some nine miles extending the existing Champa-Korba line. The new construction will take the rail connection across the Hasdee River. The line is primarily intended for movement of coal from the collieries which are being developed on the west bank of the river. The construction, which will be carried out by the South Eastern Railway, is likely to cost about Rs. 1·71 crores.

### Coal Supply to Railways

The Deputy Minister of Railways, Mr. S. V. Ramaswamy, stated recently in a written reply to a question in Parliament that the overall locomotive coal stock position had improved to the extent that stocks had gone up from six days' consumption on June 1, 1960, to 11·2 days' consumption on October 31, 1960. Some improvement had also been made in the quality of coal supplied. The Deputy Minister said that with a view to improving and ensuring supply of the right type of coal, a new organisation for coal inspection had been set up in the Bengal and Bihar coalfields, and railway inspection introduced from August 10, 1960 for coal received from the public sector collieries situated in the Karanpura and Bokaro coalfields. Similar inspec-

tion was proposed to be extended shortly to the coal coming from collieries in the private sector.

## CANADA

### Bulk Food Hopper Wagon

Seventy tons of bulk sugar, one of the largest shipments ever to travel over Canadian Pacific Railway lines, left the Montreal refinery of the St. Lawrence Sugar Company for Adams' Brands Limited, Scarborough, Ontario, contained in a newly-designed railway wagon. Designed to accelerate the movements of large bulk shipments, the "dry flo" covered hopper rail wagon, built by the General American Transportation Corporation, Chicago, is capable of carrying a load limit of 142,000 lb. of various food products and dry materials. Introduction of this type of covered hopper not only does away with the costly procedure of bagging sugar, but reduces by more than half the time taken in loading and unloading wagons, resulting in faster shipment and handling of bulk products.

## IRELAND

### C.I.E. Line Closures

The Waterford-Tramore rail services will be terminated at the end of December, those on the West Clare section at the end of January, 1961, and on the West Cork section at the end of March. The statutory notice in regard to the Waterford-Tramore section has already been published, and the notices in respect of the other sections will be issued in due course. Road services will be substituted for all three.

## FRANCE

### Introduction of Electrification

Electric traction will be introduced throughout between Bar-le-Duc and Strasbourg from December 18. Timings of trains using the line will be modified in consequence from that date.

### New Express Service

A new evening express train the "Capitole" between Paris and Toulouse, first class only with supplement commenced running three times a week on November 15, and will continue at least until March 31.

## HUNGARY

### Use of Oil

The Hungarian Ministry of Heavy Industry is recommending more factories to go over from coal firing to oil firing because the use of fuel oil in Hungary has not kept pace with the country's expanding oil production and because in many cases, oil would be more economic. Under the second five-year plan, which starts in January, 1961, oil firing should be used to a greater extent in foundries, cement factories, in alumina manufacture and in heating power stations, and the State Railways should be encouraged to use oil more widely, says the Ministry statement. The railways are already planning to adapt 100 locomotives for oil firing.

## U.S.S.R.

### Railway Delegation to U.S.A.

A Soviet railway delegation, headed by Mr. B. P. Beshchev, U.S.S.R. Minister of Railways, has arrived in Washington on a return visit for that paid by an American railway delegation to the U.S.S.R. in the summer of this year. The delegation will spend a month in the United States, visiting, besides Washington and New York, such cities as Chicago and New Orleans and familiarising themselves with the operation of American railways and the work of corresponding United States research institutions.

### Aid for Syria

The Presidium of the U.S.S.R. Supreme Soviet has ratified the protocol on Soviet technical aid in building a number of undertakings in the Syrian region of the United Arab Republic. According to the protocol, which was signed in Moscow on September 7, the Soviet Union will render technical assistance in building the 480-mile Kamyshli-Aleppo-Latakiya railway.

## Publications Received

*Locomotive Stock Book*, 1960.—Compiled by W. T. Stubbs and M. G. Boddy. Published by the Railway Correspondence & Travel Society, and obtainable from its Hon, Assistant Publications Officer, Mr. N. J. Claydon, at 19, Dene Court Road, Olton, Solihull, Warwickshire. 8 in. x 6 in. 84pp. plus 52pp. plates. Paper covers. Price 13s. 6d.—This is the twelfth issue in the R.C.T.S. "Locomotive Stock Book" series, and with its publication 25 years of stock alterations have been placed on record. The method of presentation adopted in previous editions has been retained. The numbers of all locomotives on British Railways, London Transport Executive, 12 other British lines, and the Irish railways, as at December 31, 1959, are listed, under their respective wheel arrangements, sub-divided into classes; the names of British Railways locomotives are given a separate section. Alterations to stock between 1955 and 1959 are set out in similar style, and there is a tabular analysis, as well as an introductory review, covering the five years. All classes which have become extinct since the last publication are illustrated.

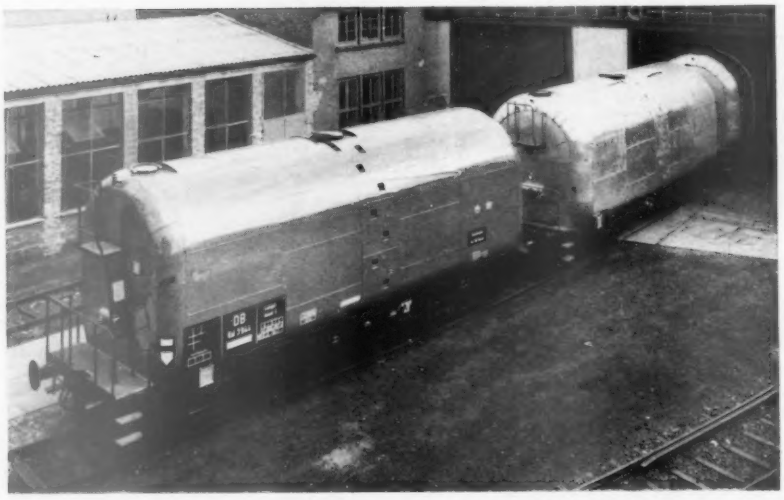
*The Harvey Team.*—This 18-page brochure is intended to give an insight into the overall activities of G. A. Harvey & Co. (London) Ltd. for those who may know only one or two departments with which they deal. It includes portraits of the directors, departmental managers, and senior personnel and illustrated descriptions of typical products and sections of the plant. Copies may be obtained from G. A. Harvey & Co. (London) Ltd., Woolwich Road, London, S.E.7.

*Guide to the Drafting of Specifications for Rubber Products.*—This leaflet has been compiled by the Specification Advisory Committee of the Federation of British Rubber & Allied Manufacturers as a first step towards reducing the difficulty experienced, even by specialists, in keeping abreast of the full range of modern developments in rubber technology. Rubber specifications present special problems to the engineer partly because the physical behaviour of the material differs so profoundly from that of metals. Also for some time rubber manufacturers have been concerned at the large number of specifications met with in everyday practice which are inadequate for their purpose and on occasions perhaps even deleterious. The guide gives advice on the kinds of test most useful for performance testing by the user and quality-control testing by the manufacturer, and on the dimensional tolerances appropriate to different kinds of rubber component. It recommends the use of British Standards where these are available and suitable for the purpose required. Accompanying the guide is a series of questionnaires which enable information required for each different category of rubber product to be made known. Copies may be obtained free of charge from the Federation of British Rubber & Allied Manufacturers, 43, Bedford Square, London, W.C.1.

*Chains and Fittings.*—A revised British Standard publication, B.S.4; Lifting tackle, Part 2: 1960, Chains and fittings, edited by Mr. L. Linder, deals with the subject matter in sections 4 and 5 of the 1946 edition. Eight of the 15 material specifications summarised are new since the last edition. There are two sections, the first is devoted to chain. Standards summarised are: B.S.394, Short link wrought iron chain; B.S.590, mild-steel chain, grade 30; B.S.1663, Higher tensile steel chain, grade 40; B.S. 1696, Short link wrought iron chain, of special quality; and B.S. 3113, Alloy steel lifting chain, grade 60. Section two deals with five ranges of hooks compared with only two in the earlier edition. A wide range of D and bow shackles is standardised in mild steel (B.S.825) and in higher tensile steel a third as strong again (B.S.3032). The rings and links included in chain slings are specified and related to the equivalent standard chain and hooks. Single-, two-, three-, and four-leg slings are standardised, also reevable or non-reevable single legs. Materials are wrought iron (B.S.781) or higher tensile steel (B.S.2902). The standard for eyebolts (B.S.529) is included. Forty pages summarise statutory regulations relating to factories, docks, shipbuilding, and building. Copies, price £2, may be obtained from the British Standards Institution, 2, Park Street, London, W.1.

# High-capacity Tank Wagons

*Vehicle of 16,000 gal. capacity obtained by departing from conventional cylindrical shape*



*Oil tank wagons of 16,000-gal. capacity for 20-ton axleload*

TO-DAY'S very large traffic in mineral oils and similar liquids has led to tank wagons of high capacity being found on railways in all continents. Not only is great capacity becoming necessary to handle economically what is regular bulk traffic, e.g. the daily 2,000-ton train from Eastern Holland to Rotterdam on the Netherlands Railways, but special requirements such as heating are becoming more common.

### Departure from Cylindrical Shape

To cope with these specifications a new variation has been introduced by Gebr. Credé, of Kassel, in which the normal cylindrical tank, now built more or less out to the loading gauge, has been expanded into a shape with vertical sides, flat bottom, and almost semi-circular top. By this means the 6·6 sq. m. (71 sq. ft.) cross section, which is about the maximum which can be taken by the European loading gauge in circular shape, has been increased to 7·9 sq. m. (85 sq. ft.), and with a flat-ended tank 9·9m. (32 ft. 6 in.) long the capacity inside is some 72 cu. m. (2,540 cu. ft.), or 15,800 gal. With oil at a specific gravity of 0·84 and about 96 per cent. filling, this represents a load of 58,000 kg. (128,000 lb. or 57·2 tons). The wagons of this type now running are built to a tare of 22,700 kg. (22.4 tons), so that a full 20-ton axleload is produced when carrying maximum load; and the wagons are air-braked and designed to run at a top speed of 100 km. p.h. (62 m.p.h.) so that they can be run in express block trains.

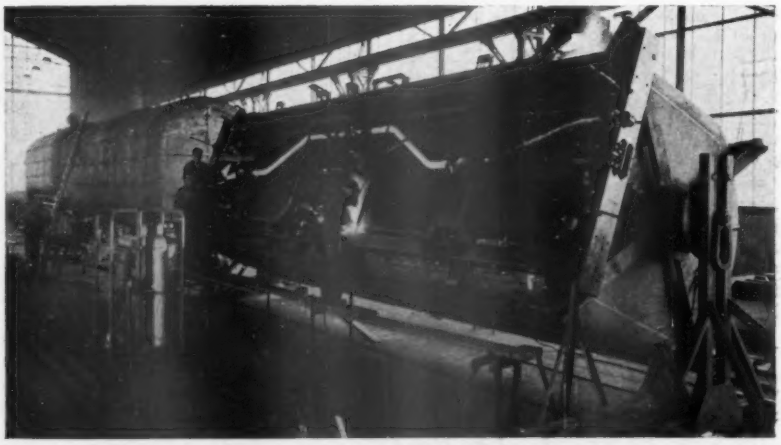
It is interesting to make the comparison that a train of 30 of these wagons with a total capacity of 2,160 cu. m. (72,200 cu. ft.) measures 342 m. (1,125 ft.) over buffers, whereas a 30-wagon train of the largest Central European cylindrical tank wagons of the same total capacity extends over a length of 402 m. (1,320 ft.); within a train length of 348 m. (1,145 ft.) only 26 of the cylindrical-tank wagons with a total carrying capacity of 1,872 cu. m. (66,000 cu. ft.), or 13 per cent less than the Credé wagons, can be accommodated.

In construction the tank is welded up of MRSt.37Cu copper-bearing steel plates, 7 mm. thick on the underside, 6 mm. thick at the sides, and 5 mm. thick on top; and there are four inside stiffening cross plates, and other cross and longitudinal stiffeners. The tank is tested to a pressure of 1·5 atm. (22 lb. per sq. in.). Floor plates are 8 mm. thick, and the tank is welded direct to two longitudinals forming the underframe, and carrying the buffing and drawgear by welded drag-boxes which extend inwards to the bogie pivots. Filling of the tank is done through two holes, one in the centre and one at the wagon end, where there is a cross platform and steps. Unloading can be effected through a valve with control handle at each side of the wagon, and though the earlier wagons had manual operation of the valve, in the later examples the control from the side is through hydraulic means.

### Tank Insulation

The outside of the tank is insulated by a 100 mm. (4 in.) thick mat of superfine glass wool, itself covered by a 1 mm. galvanised steel sheet. It is considered that with an ambient temperature of —20° C. the temperature at the tank centre will have fallen in 80 hr. only to 70° C. from an initial filling at 100° C. If an uninsulated tank wagon meets requirements, then maximum possible capacity can be increased by 8 cu. m. (282 cu. ft.) to a total of 80 cu. m. (2,822 cu. ft.). To keep liquid put in at a lower temperature to a viscosity at which it remains free flowing, heating coils with a total surface of 23 sq. m. (247 sq. ft.) are arranged just above the tank bottom; they can be fed either from the locomotive through the train-heating line, with which these wagons are fitted, or from a stationary supply if the wagon is standing.

The bogies are of German Federal Railway standard freight-wagon type with roller-bearing axleboxes to take the 20-ton axleload; dimensions are 950-mm. (37·5-in,) wheels, 2·0 m. (6 ft. 6¾ in.) wheelbase, and 6·1 m. (20 ft.) between bogie pivots. Knorr air brakes, with goods and passenger train settings, are fitted, and apply blocks on all wheels through two 14-in. cylinders; the hand-brake, operated from one end, also applies the blocks on all wheels. Underframe length is 10·16 m. (33 ft. 4 in.) and length over the Uerdingen ring-spring buffers 11·4 m. (37 ft. 5 in.).



*Tank-wagon underframes under construction at Niederzwehren: in the background two tanks are under fabrication*

# New Signalling at Glasgow Central, Scottish Region

*Due to operate shortly, the scheme has obviated renewal of the bridge over the Clyde, and provides for complete flexibility in working*

GLASGOW Central Station, one of the two Glasgow termini of the former Caledonian Railway, has 13 platforms, and until recently its immediate approaches consisted of 10 running roads carried by two parallel bridges over the River Clyde.

Immediately beyond these bridges there are first some carriage sidings, and then at Bridge Street Junction the line to Paisley, Greenock, Gourock and a number of Glasgow suburbs diverges to the right. A short distance further on, at Eglinton Street Junction, the line to the Cathcart Circle and other Glasgow suburbs diverges, again to the right. The main line, consisting of four tracks, goes onwards to Rutherglen, Carstairs, Edinburgh, and the South.

### Renewal of Clyde Bridge

Some five years ago, it became clear that the eastern most of the two Clyde bridges, carrying four roads and serving the eastern side of the station, was in need of renewal. It was also decided to electrify the Cathcart Circle and its attendant branch lines on the basis of 6·25/25 Kv., 50 cycles, a.c. An examination of the problem showed that if both-ways working was introduced on many of the roads leading into Glasgow Central Station, then sufficient facilities would be made available to enable the six roads on the westernmost bridge to do the work of the former 10. In any case electrification plans made it necessary to re-signal the whole area.

The layout has been re-modelled. The eastern bridge is to be abandoned, and a new signalbox has been built. This is situated on the south side of the Clyde in the "V" between the Gourock and other lines, and is due to come into operation early in the New Year. It contains a console, based on the O.C.S. principle. It replaces four signalboxes: Glasgow Central, Bridge Street Junction, Eglinton Street Junction, and Eglinton Street Station. Glasgow Central was an electro-pneumatic power box, and at the time of its installation in 1907 it was, with its 374 levers, the largest of its kind in the country. Bridge Street Junction, Eglinton Street Junction, and Eglinton Street Station were mechanical boxes. All operated semaphore signals, but colour-light signalling is now being introduced throughout the area.

### Heavy Traffic at Central Station

These details give some indication of the magnitude of the new project. A further factor is that Glasgow Central is a very busy station. Besides the long-distance day and night trains to and from the South, there is a very heavy commuter service to Glasgow suburbs and their environs, also down the Clyde as far as Gourock.

On these services there is a mid-day besides morning and evening peaks, for many people working in Glasgow go home to lunch. There are engine movements to and from Polmadie Shed, a few miles down the main line, also movements of empty coaching stock, both into and out of the sidings immediately across the Clyde and also into Smithy Lye carriage sidings, to which access is gained at Cook Street, the first signalbox down the Gourock line. Many of these movements are propelling movements, and as described later, special provision has been made for these.

The diagram shows how the roads splay out after crossing the River Clyde, and the various connections both in the station itself and at the former Bridge Street and Eglinton Street Junctions. It shows also which roads are signalled for both-ways working. The signalboxes immediately beyond the Glasgow Central area are: Cook Street on the Gourock line; Pollokshields East Junction on the Cathcart Circle line; and Larkfield Junction on the main line. At some future date they will all be incorporated in re-signalling schemes.

### Colour-light Signals

In the outermost areas, the running signals are four-aspect colour lights, a "delayed yellow" aspect being given in special circumstances for engines only. But in the down or inwards direction, the platform inlet signals (*i.e.*, 55–58 and 74, 76) give only a red or green aspect, and so the signals immediately preceding them give only three aspects, omitting the double yellow.

The starting signals at the end of the platforms are three aspect, and the starting signals along the platforms inside them are two aspect. All colour-light lenses have special segments to enable a driver to see them when he is standing close to the signal. In the outermost areas junction indicators are used. Elsewhere route indicators are of the "theatre" type.

Subsidiary signals attached to running signals are of the standard type, showing when "off" two white lights at an angle of 45 deg. An additional calling-on indication showing an illuminated letter "C" is provided beneath the platform inlet signals. Miniature signals, showing, when "off," a yellow light, are provided to give access in the facing direction from the running lines to the sidings.

Each platform road is divided into several track circuits, and can accommodate two short trains. Therefore, fundamentally, the controls first used at Liverpool Lime Street, London Midland Region, are applied.

If the platform is clear to the buffer stops, the inlet signal gives a green aspect. If the inner track circuit is occupied, but there is still room for a short train, then on a train reaching the berth track circuit behind the inlet signal, the subsidiary signal comes off and the calling-on indication is given. If there is room in the platform for less than a three-car electric set, then, for the subsidiary and calling-on indications to be given, the berth track circuit must be occupied and the track circuit behind it cleared (the berth track circuits are not long enough to hold a three-car set). Finally, if the whole platform is occupied, but it is a question, say, of attaching a couple of vans to a train, only the subsidiary signal clears, and no calling-on indication is given.

### Supplementary Signals

As stated, the starting signals at the end of the platforms are in most cases supplemented by "inner" starting signals spaced along the platforms. These last are for the benefit of short trains, and are "led" by the starting signals at the end of the platforms. They also carry subsidiary signals. All the platform starting signals carry back indications, in case a driver is standing just beyond a signal. Their route indicators also show both ways. All these signals also carry a small stencil, which when illuminated shows the letter "R." When a train is ready to start, the guard at its rear presses a plunger situated on the platform, and provided that the relevant starting signals are "off" this causes the stencil to show "R." In this way the driver receives the "right away" signal, even although in most cases the curvature of the platforms means that he is out of sight of the guard.

### Propelling Movements

Special provision is made for propelling movements from the platforms to the carriage sidings, and in some cases elsewhere. The miniature yellow signals on the main gantry (for example, 83, 84, 85, 86) are repeated in their rear by small banner stencils attached to the platform starting signals.

There are special switches on the console for propelling movements. If one of these switches is operated, then, provided that the route selected is available, the whole route is set up and every signal along it, including the repeater banner, is cleared at once—regardless of the fact that normally the miniature yellow signals would give a delayed apsect, clearing only when the berth track circuit was occupied. Each signal would only return to the "on" position when the whole train, with its engine in rear, had passed it. In this way, delay is avoided, and once the driver has seen the banner stencil, he knows that, apart from emergencies, he can proceed the whole way into the siding. Similar facilities are provided where needed on the far side of the Clyde.

Position-light ground subsidiary sig-

nals are of the standard pattern. When "on" they show a red and white light horizontally, and when "off." two white lights at an angle of 45 deg. Below each signal is an arrow pointing to the road to which it applies. This arrow is permanently illuminated by means of a Perspex tube leading from the "pivot" light which is always illuminated, whether the signal is "on" or "off."

### Alternative Route Signalling

Where a ground signal applies to more than two alternative routes, it has a stencil route indicator. But if there are only two alternative routes, then two ground signals are installed, one on top of the other. Most ground signals have their own switches, but some are required solely to hold engines. These have no separate switches, but are cleared by the switch of the preceding running signal.

As the diagram shows, facilities for both-ways working are provided on Nos. 3, 4, 5, 6 lines as far as Bridge Street, on both the lines from there to Cook Street, and on No. 3 and 4 lines from Bridge Street to Eglinton Street. Their great value appears if, at any time, there is a preponderant flow of traffic either inwards or outwards. Then a series of trains can be sent following each other along any of these roads. There is little gain in using one of these roads to send first a single train in, say, the outwards direction, and then the second train in the inwards direction.

As trains are only moving slowly throughout the area, overlaps beyond signals are kept short, usually of about 80 yd. This adds to the ease of both-ways working.

Interlocking is arranged both from the standpoint of safety and also to prevent two trains from getting into inextricable positions. Take as an example, No. 3 line to Bridge Street. Signal 118 naturally locks signal 175, if it is desired to use 175 to give access to this line. But equally if signals 83, 84 or 85 are taken off to give access to this line, signal 175 is locked. Otherwise two trains would be found facing each other at signals 118 and 146—in perfect safety, but with no way of disposing of them.

### Block Working

Block working is now in force to Cook Street, with "both-way" block instruments for each line. As a measure of safety, if the Cook Street signalman has accepted a train from Glasgow Central along No. 2 branch, that is, in the up direction, he cannot accept a down train from Pollokshields or Pollok Junction until the first train has either cleared, or occupied the berth track circuit. In the latter circuit, a time release has also to operate. Again, if the Glasgow Central signalman accepts a train from Cook Street along No. 2 branch, the turning of the commutator sets 386 points to normal and holds them there. Glasgow Central and Cook Street also slot each other's signals for moves along either branch line in the normally "wrong" direction (e.g. 187 signal for a move along No. 2 branch). 187 signal also has a warning signal to let trains up to Cook Street know when the overlap beyond the latter's signals is occupied.

Both-ways working along these branch lines is a most useful facility. Thus it allows empty carriage movements along No. 1 branch from Smithy Lye carriage sidings while a train from the Gourock direction is coming in along No. 2 branch.

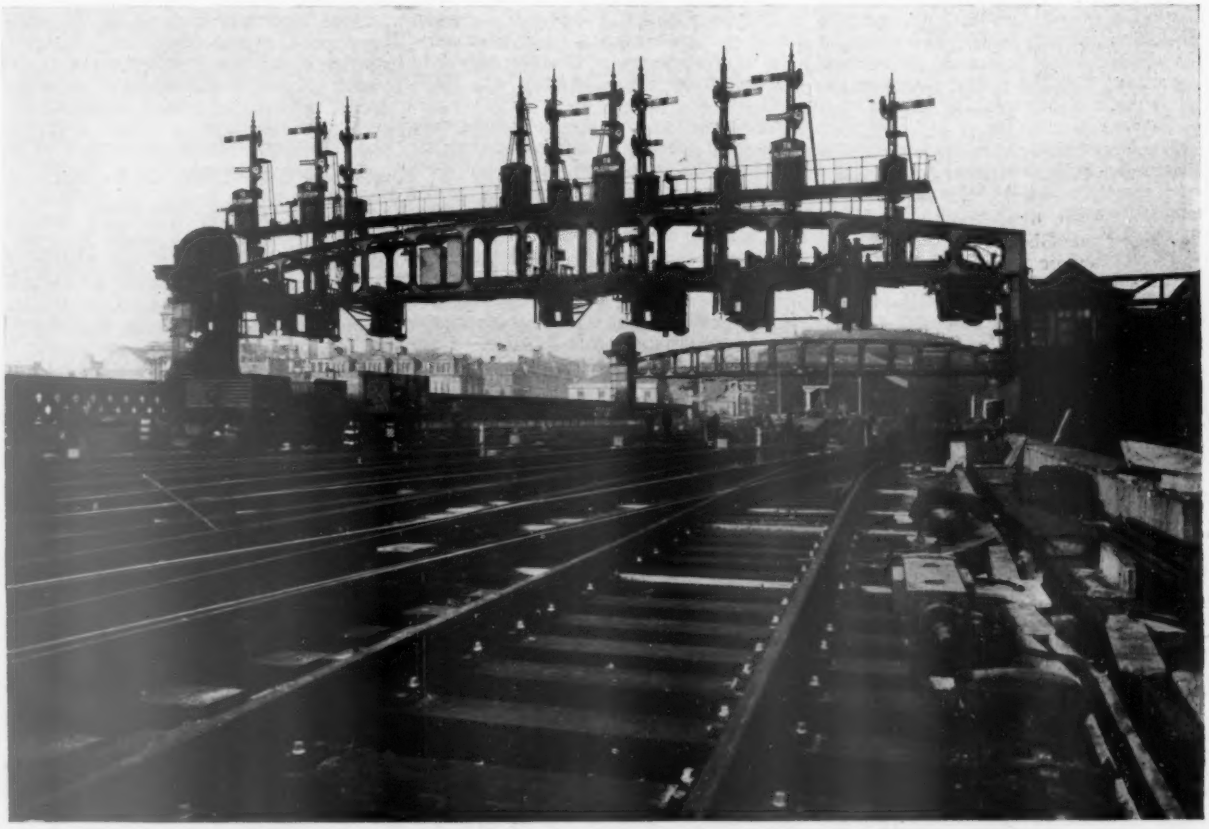
### "Overlay" Track Circuits

Another facility is provided by special 16 Kc/s high-frequency "overlay" track circuits superimposed on the normal track circuits in the rear of certain outlying signals (e.g. 174, 175, 184, 185). Each such signal is preceded by a berth track circuit and the overlay track circuit is superimposed thereon.

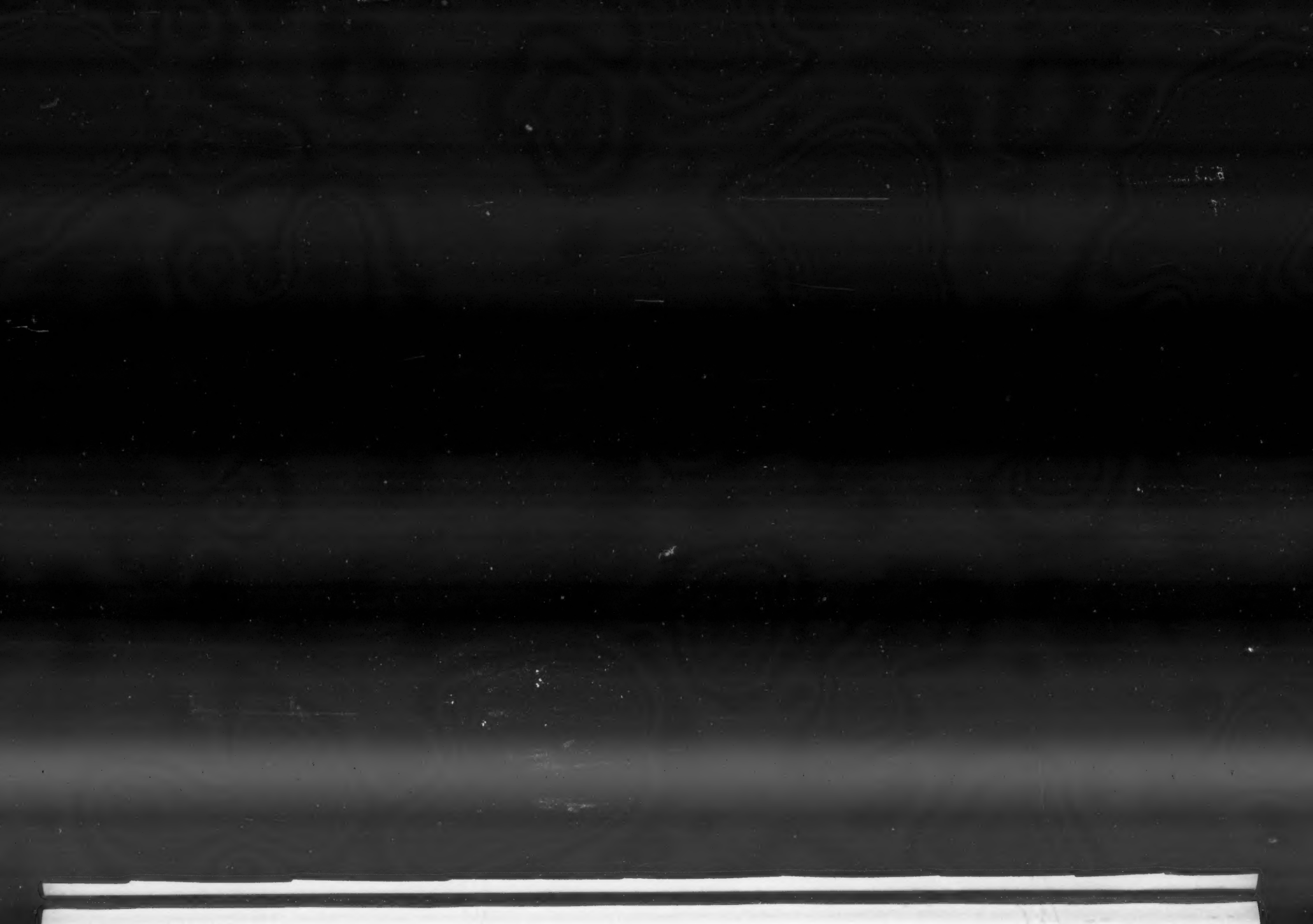
Once an engine has occupied and cleared the overlay track circuit and occupied the berth track circuit, the signal can clear to yellow, even although the overlap beyond the signal next ahead is occupied. In this way an engine can be dropped down a stage further in readiness for its next move. This facility is very useful for engines coming in from Polmadie through Eglinton Junction, to be sent back from Bridge Street to Cook Street and Smithy Lye sidings.

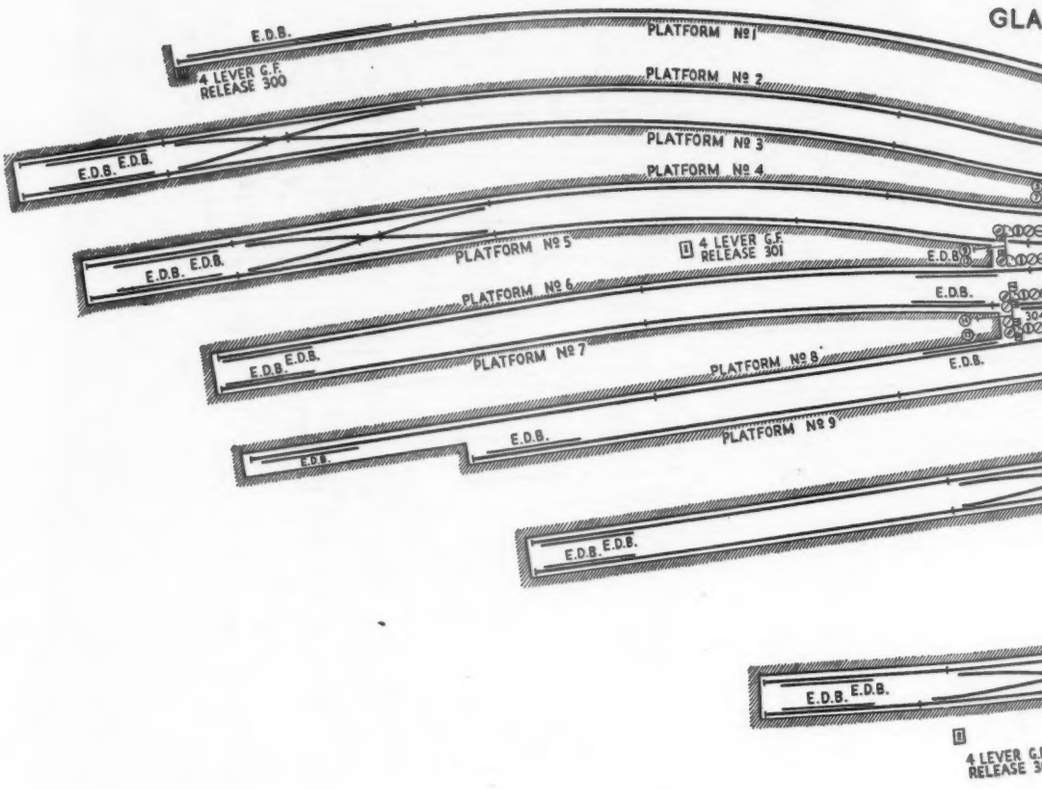
The point machines are electro-pneumatic controlled by style "D2" A.C. immunised point valves. All movements are fitted with electro-pneumatic track locks. Air is fed to them from the compressors through 1½ in. polythene pipes.

The signalbox measures 140 ft. x 40 ft. It consists of four storeys. In the base-



*Main signal bridge showing old and new signals on the approaches to Glasgow Central Station*




GLA
E.D.B.
PLATFORM Nº 1
4 LEVER G.F.
RELEASE 300
PLATFORM Nº 2
E.D.B. E.D.B.
PLATFORM Nº 3
PLATFORM Nº 4
E.D.B. E.D.B.
PLATFORM Nº 5
4 LEVER G.F.
RELEASE 301
E.D.B.
PLATFORM Nº 6
E.D.B. E.D.B.
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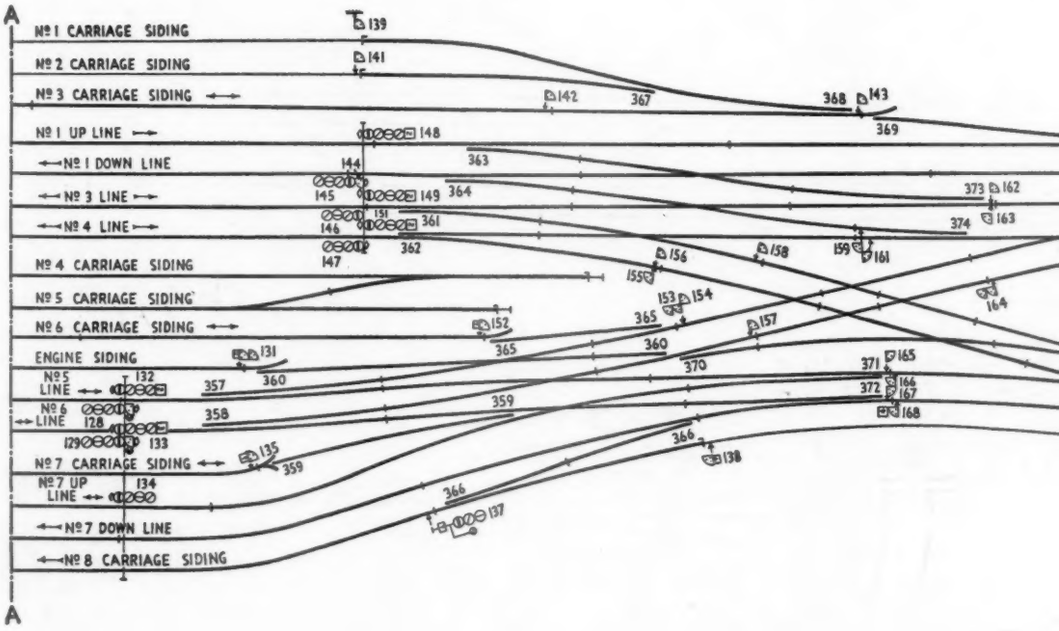
RELEASE 3


A
Nº 1 CARRIAGE SIDING
Nº 2 CARRIAGE SIDING
Nº 3 CARRIAGE SIDING
Nº 1 UP LINE
Nº 1 DOWN LINE
Nº 3 LINE
Nº 4 LINE
Nº 4 CARRIAGE SIDING
Nº 5 CARRIAGE SIDING
Nº 6 CARRIAGE SIDING
ENGINE SIDING
Nº 5 LINE
Nº 6 LINE
Nº 7 CARRIAGE SIDING
Nº 7 UP LINE
Nº 7 DOWN LINE
Nº 8 CARRIAGE SIDING
A
139
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142
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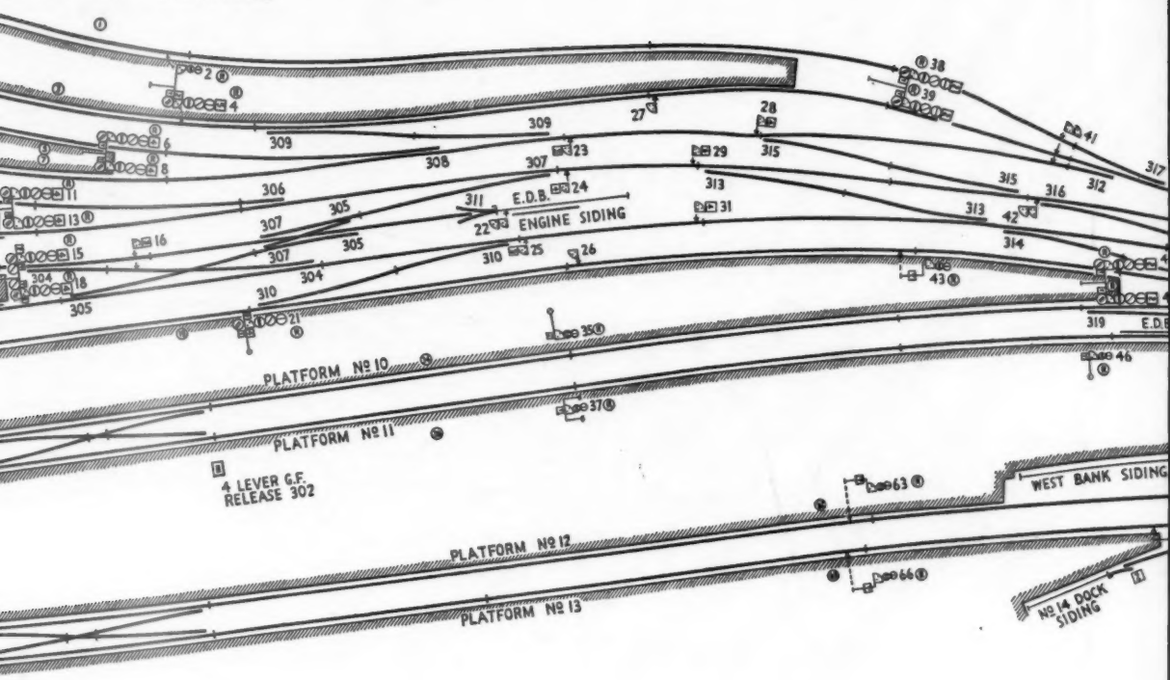
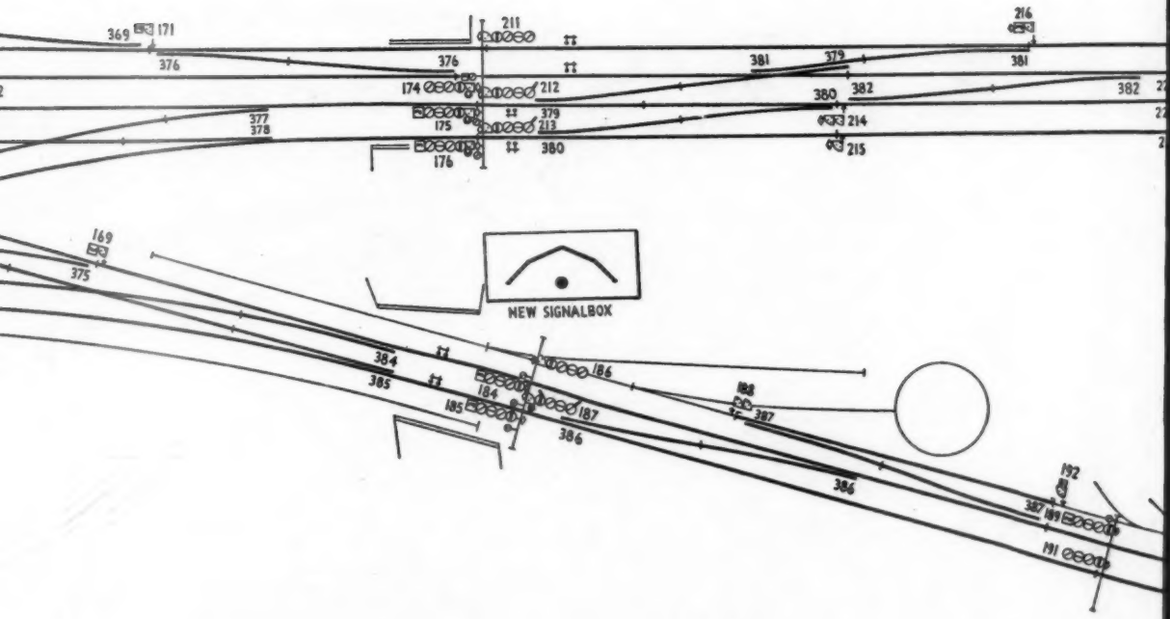
LIN

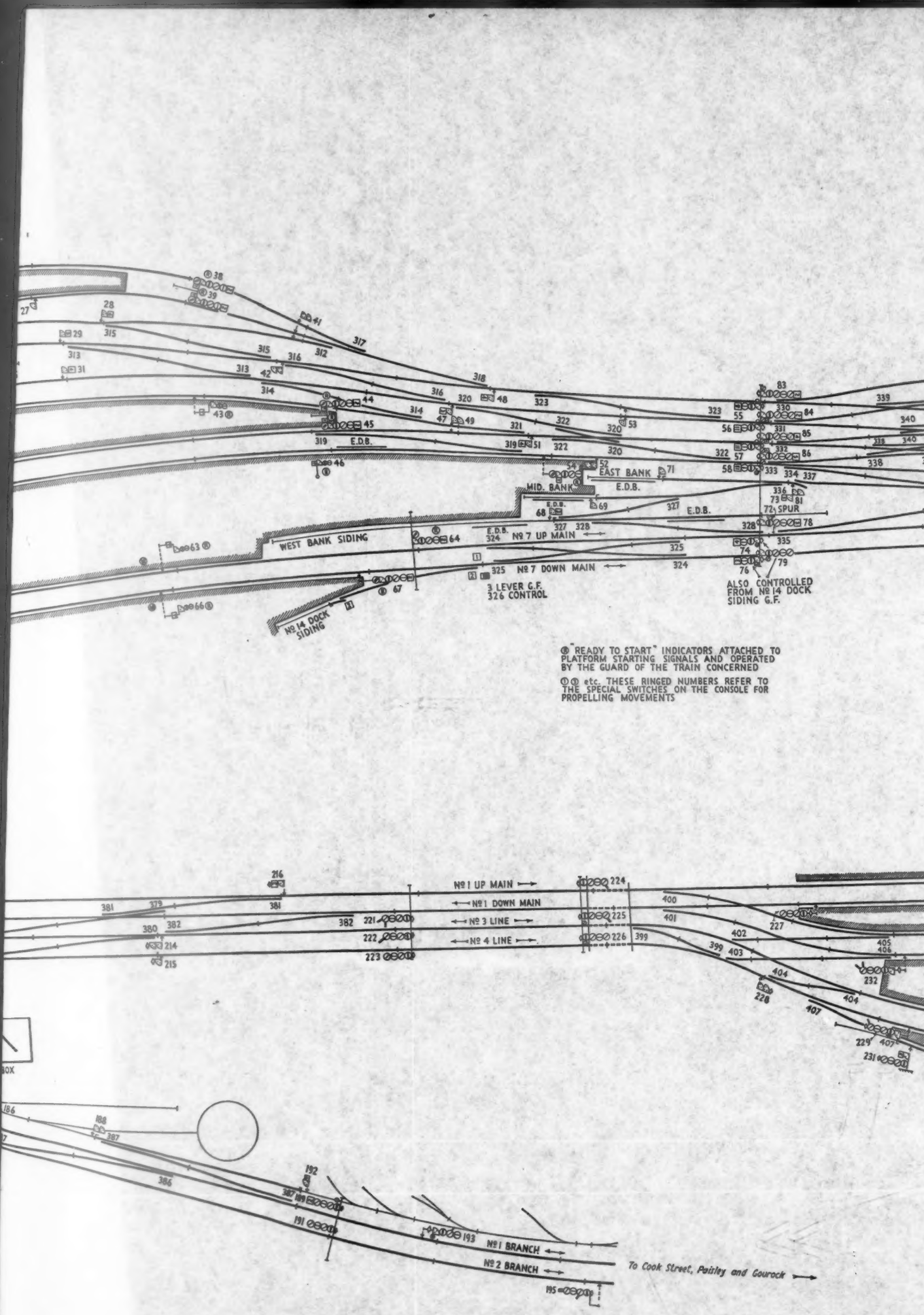
GLASGOW CENTRAL




VER G.F.
EASE 303



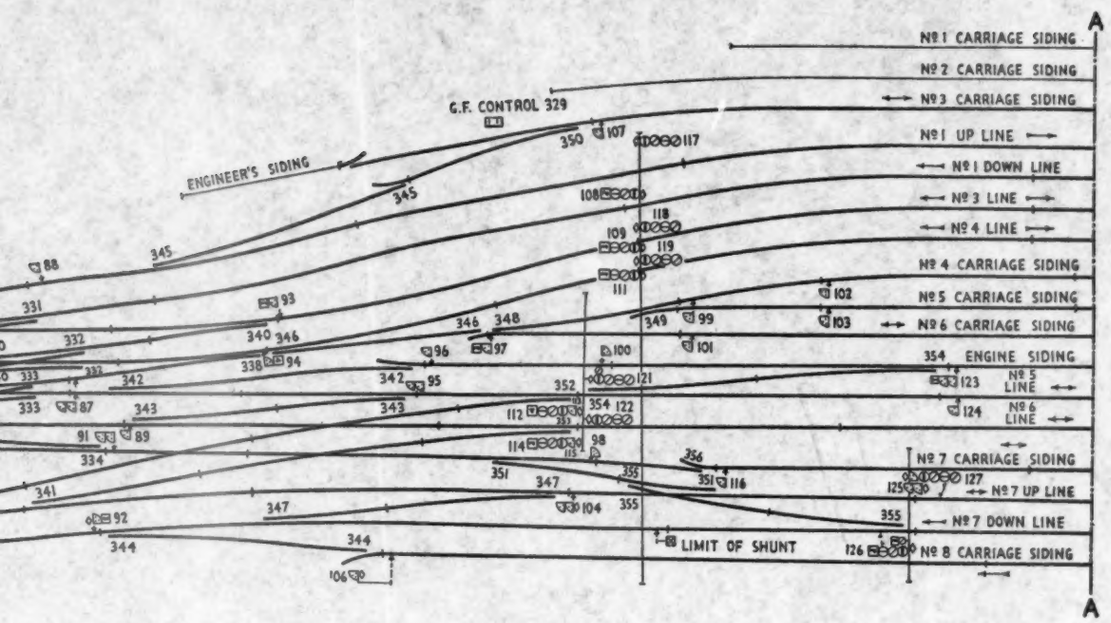

LINES AND SIGNALLING CONTROLLED FROM NEW SIGNALBOX AT GL

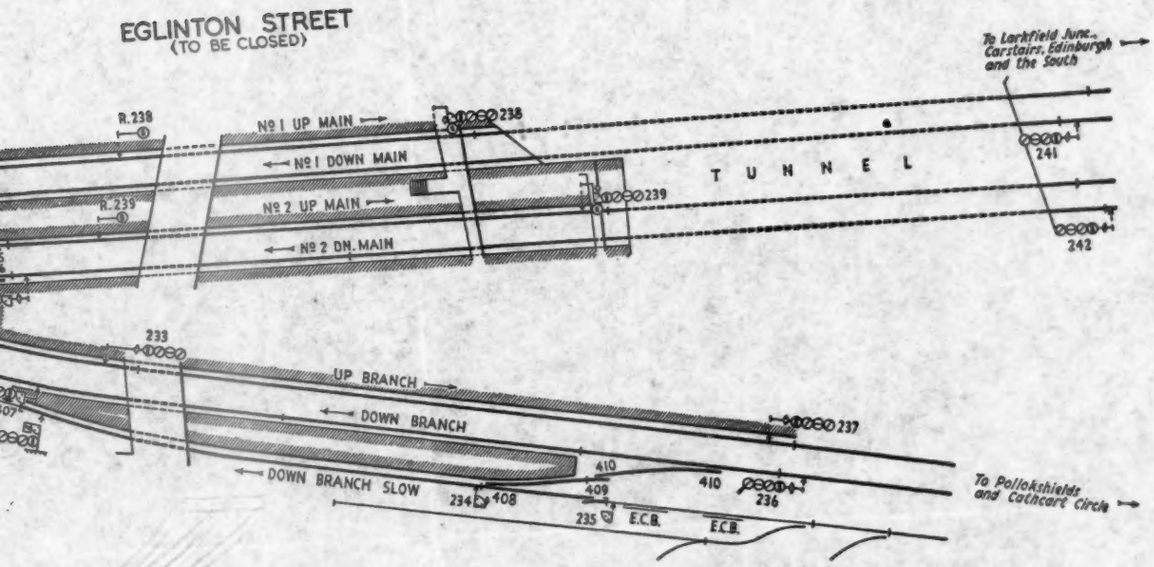



⑱ "READY TO START" INDICATORS ATTACHED TO PLATFORM STARTING SIGNALS AND OPERATED BY THE GUARD OF THE TRAIN CONCERNED

①② etc. THESE RINGED NUMBERS REFER TO THE SPECIAL SWITCHES ON THE CONSOLE FOR PROPELLING MOVEMENTS

**LED FROM NEW SIGNALBOX AT GLASGOW CENTRAL, BRITISH RAILWAYS, SCOTTISH R**


A
Nº 1 CARRIAGE SIDING
Nº 2 CARRIAGE SIDING
Nº 3 CARRIAGE SIDING
G.F. CONTROL 329
ENGINEER'S SIDING
Nº 1 UP LINE
Nº 1 DOWN LINE
Nº 3 LINE
Nº 4 LINE
Nº 4 CARRIAGE SIDING
Nº 5 CARRIAGE SIDING
Nº 6 CARRIAGE SIDING
354 ENGINE SIDING
Nº 5 LINE
Nº 6 LINE
Nº 7 CARRIAGE SIDING
Nº 7 UP LINE
Nº 7 DOWN LINE
LIMIT OF SHUNT
Nº 8 CARRIAGE SIDING
A


EGLINTON STREET
(TO BE CLOSED)
To Larkfield Junc., Carstairs, Edinburgh and the South
R.238
Nº 1 UP MAIN
Nº 1 DOWN MAIN
R.239
Nº 2 UP MAIN
Nº 2 DN. MAIN
TUNNEL
UP BRANCH
DOWN BRANCH
DOWN BRANCH SLOW
E.C.B.
E.C.B.
To Pollokshields and Cathcart Circle

SH REGION

ment, at street level and below rail level is the power room, and also a workshop and messroom for the linemen. At rail level there is a room containing telecommunications equipment and the entry points for the cables leading to all parts of the area. On the first floor there is the relay room, and on the second floor the operating room and messroom, and also a small observation room from which a view can be obtained of a large part of the area. The staircase is in a tower jutting out from the main building like the short arm of the letter " L."

### Console in Operating Room

In the operating room the console is divided into four sections, each normally under a signalman. These sections join each other at an obtuse angle. Immediately above them, and running the whole of the length is the main illuminated diagram, and above that again is a modified diagram showing the train descriptions. The console itself is divided laterally into two halves. The upper half, at a steeper angle, contains the block instruments working to adjacent boxes, the describer " set-up," " interpose," " transmit " and " cancel " buttons, the indicators and switches for the signal post telephones, and the emergency individual point switches and indicators. The block instrument commutators for incoming trains are the normal type, but the block indications themselves are given by three lights—white for " line blocked," green for " line clear," and red for " train on line."

### New Features

The lower half of the console contains the route-setting switches, controlling the points and signals. Here are several new and interesting features. A study of the diagram will show that many signals, of which the platform inlet signal 57 is an example, not only lead to a number of different platforms but also to each of several of these platforms, by various alternative routes. Had a separate switch been provided for every one of these possible routes, the result would have been a confusing medley. In view of the prevalence of " both-ways " working, it is desirable to show the signalman whether he has set up a route for an inwards or outwards move.

To meet these needs, the console is ruled vertically into columns, one for each signal (or group of signals, running, shunt and calling-on). Reading from the top of the column, there are:—

(1) A group of perspex buttons, one for each of the destinations to which the signal gives access.

(2) In the case of alternative routes to a destination, a rotary route selection switch.

(3) Repeater lights, red for " on," green for a running signal " off " and white for a subsidiary signal " off."

(4) In many cases, a cancelling button.

(5) The route-setting switches: (*a*) Red for a subsidiary signal; (*b*) white for a subsidiary signal; (*c*) white with the letters CO for a calling-on signal; and (*d*) red with a white bar for the special switches for propelling movements; these last have their own separate numbers and columns.

The procedure for operation is as follows:-

Assume signal 58 is to be taken off for a move into platform 7. There are five alternative routes into platform 7.

The signalman first presses the perspex destination button in signal 58's column labelled platform 7. This at once becomes illuminated, to remind him that that is the one he has pressed.

He then looks at the illuminated diagram. If the route selected is free, then a row of lamps light up on the diagram along that route and its overlap in magenta colour. This tells him that the route is available.

If the route is not available, he turns his route selection switch to the next alternative route, and so on until he finds an available route. If no routes are available, he can cancel by pulling up the perspex destination button.

### Setting Up Route

When he has found an available route, he turns the desired signal switch, running, shunt, or calling-on. This sets up the route, and when the points are locked and detected in the correct position, takes off the signal. At the same time the route lights on the diagram change from magenta to yellow as the movement is ingoing. For outgoing movements the route set lights are white.

Certain switches operate both a running signal and one or more subsidiary signals between it and the next running signal. The cancelling button is used in case it is desired in an emergency, to restore a subsidiary signal to the " on " position in the face of a train which has passed the running signal.

When a track circuit is occupied, a red light appears on the diagram at each end of that track circuit. Running signals are normally held at danger when a train occupies the track circuit ahead, but special provision is made for trains standing just ahead of the platform starting signals. Main and subsidiary signals are restored to danger when the whole of the train has passed them. The route lights, white or yellow, continue to show until either the train has cleared or has been brought to a stand and an appropriate time release has operated. They also indicate when a route is approach-locked.

### Propelling Switches

Each propelling switch, red with a white bar, has a column of its own. As it sets up the route and takes off every signal right into the siding, each such switch naturally governs a wide range of alternative moves. Thus switch 17 governs propelling movements from platform 8 into sidings 3, 4, 5, 6, and 7. There are several ways of getting into some of these sidings, with the result that switch 17 controls 19 alternative routes.

It has a destination button for each siding, and then two linked rotary route selection switches. The first is numbered 1-11, and then 12-19. The second is numbered 12-19. If a lower number is needed, only the first switch is used. For a higher number, the first switch is turned to the position 12-19, and then the second switch is used.

" Train ready to start " indications are given on the diagram, opposite each platform, by a flashing white light. These are given by the platform staff.

### Train Describers

Incoming trains are described in from Cook Street, Pollokshields and Larkfield Junction. Outgoing trains are not described forward to these signalboxes. Instead, block working is in force. The train describer diagram is divided into four sections, one section for the 13 platforms, another for their immediate approaches, another for the Bridge Street area, and a fourth for the more outlying areas.

The position of each signal is shown on the diagram, and opposite these are one or more stencils, on which each train or engine appears automatically as it moves forward. This allows for the possibility that one or more trains or engines may be standing in a particular platform or even at a particular signal. The " set-up " and " interpose " buttons are, as stated, on the upper half of the console.

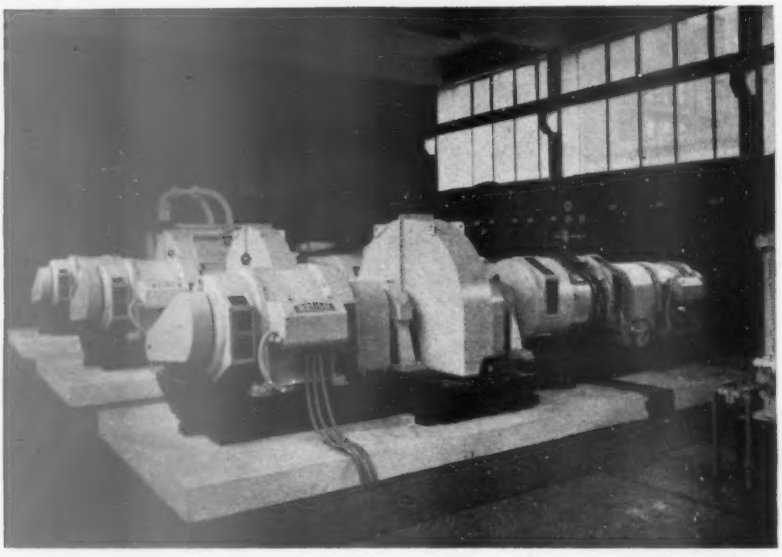
An indication for a train or engine consists of letters. Between them they show first, the description of the train, second, its origin or destination. A typical example is A-ML (express passenger for Motherwell). The Glasgow Central signalmen themselves set-up the description of all outgoing trains, and these move forward automatically on the diagram until they leave the area, as a reminder to the signalmen. Descriptions of incoming trains are, as stated, set up and transmitted forward by the adjacent signalmen. They again move forward on the diagram automatically from signal to signal. But the Glasgow Central signalmen can also interpose trains if necessary.

### Regulator's Desk

The regulator's desk is situated well behind the centre of the console at a higher level. It contains two telephone " concentrators," which between them provide communication with every necessary point. Normally there are two telephone boys on duty. This leaves the regulator free to supervise the working, and his position gives him an ample view of what is happening.

The relay room is on the floor immediately below the operating room. All the interlocking and other functions are controlled from here. It contains 105 relay racks, and 9,000 relays, all of which are of the plug-in type, so designed that a new relay can be substituted without disturbing the connections, and also so that the wrong type of relay cannot be plugged in. The interlocking relays are of the miniature type, and there are 3,000 of these.

All operating controls and indications of points and signals are fundamentally in this relay room. So also are the track circuit controls, including approach locking, route locking and time releases. But many of these controls are operated in the relay room by repeater relays. In such cases the initiating relay is situated in one of eight relay huts, situated at



*Frequency converters in the power room at Glasgow Central signalbox*

appropriate points throughout the area. Conversely, a controlling relay in the relay room may operate through a repeater relay in one of the relay huts.

### Relay Huts

These relay huts contain the relays controlling the various aspects of the running signals—red, yellow, double yellow or green. They contain the relays both operating point movements, and also for point detection and indication. They also contain the main track relays directly connected to the track circuits.

Apart from the convenience and economy of localised installations, there is one important reason for these eight relay huts. This is the need for immunising all signal circuits from possible contamination from the high-voltage traction currents which will be present when the proposed electrification schemes come into effect. In addition to the normal precautions of insulation, segregation and "earthing," all the circuits between the main relay room and the relay huts are direct-current circuits feeding immunised relays. This minimises the risk of contamination. The relay huts themselves are supplied, for their own localised functions, by a 415-V. three-phase ring main for the first six huts, while the last two huts receive 415-V. single-phase current. There are 3,000 relays in the eight relay huts, in addition to the 9,000 in the relay room itself.

Apart from the overlay track circuits already mentioned, there are 243 track circuits in the area. They are supplied with current at approximately 20V. 83 1/3 cycles, single phase. The voltage is dropped further by a series resistance before being fed to the rails. As elsewhere the use of current at 83 1/3 cycles immunises the track circuits from leakage of the 50 cycle traction current.

### Telecommunication Equipment

The floor on rail level contains the telecommunication equipment, and is also the cable "disconnection" room, into which all main cables are led. Ninety-eight cables of 40 cores each come into this room. They all terminate on a rack running the whole length of the room.

At street level and below rail level there is the power room. First it contains the main switchboard. Power is taken from the Glasgow Corporation at 415V., 50 cycles, single phase. There are two independent sources of supply. It is transformed down to 110V. 50 cycles, single phase for general signalling purposes and is converted to 50V., 24V., and 12V. d.c. for interlocking and indication purposes. There is a standby diesel set, operating at 415V., 50 cycles, 3 phase, which in case of need can supply everything. It comes in automatically if both the main supplies fail, but to secure proper phasing the transfer back to the main supply is carried out manually.

### Synchronous Frequency Converters

To supply the track circuits with their immunised current, there are three synchronous frequency converters. They convert the normal 50 cycle current into a two-phase quadrature 83 1/3 cycles supply. One of these can carry the fullest load likely to be required, leaving the second to act as a standby, while the third can be dismantled for maintenance purposes.

To supply the point machines with compressed air, there are three compressors. One of these is normally used, and alternates its duties with the second, thus leaving scope for maintenance. The third acts as a standby set.

There is "cascade" cooling for the standby diesel set and for the compressors.

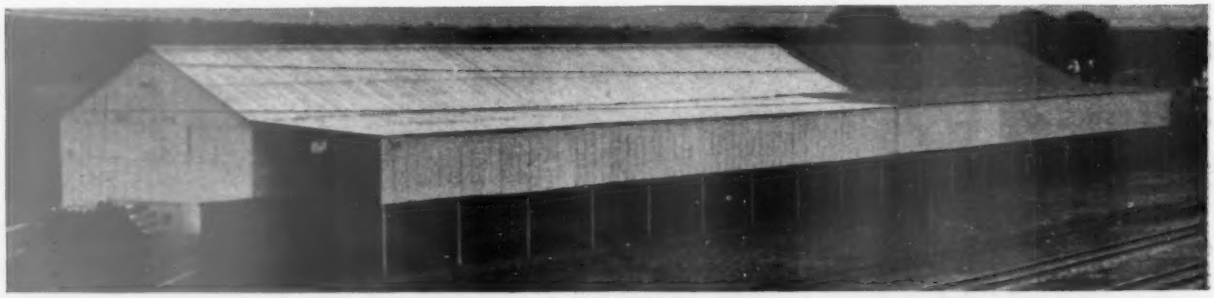
The original scheme for the work was drawn up under the supervision of Mr. W. Bryson, formerly Signal Engineer, British Railways, Scottish Region, and continued after his retirement by his successor, Mr. L. J. M. Knotts, also now retired. The work was completed under the supervision of Mr. H. O. Baldwin, now Signal Engineer, British Railways, Scottish Region.

The main contractor was Westinghouse Brake & Signal Co. Ltd., which was responsible for all the signalling work. Other principal contractors were as follow:—

| | | |
|---|---|---|
| Train describers | ... | Standard Telephones & Cables Limited |
| Signal post telephones | ... | Telephone Manufacturing Co. Ltd. |
| Loudspeakers | ... | Tannoy Limited |
| Main cables | ... | British Insulated Callender's Cables Limited |

A.E.C. VEHICLES TO BE MADE IN PORTUGAL.—A.E.C. Limited has signed an exclusive agreement with Uniao de Transportadores para Importacao e Comercio Lda, of Lisbon, for the assembly and progressive manufacture of A.E.C. buses and trucks in Portugal.

## Development on Rhodesia Railways



*Recently extended goods shed at Lion's Den, Lomagundi branch*

# Reconstruction of Chichester Station

*Extensive use of plastics provides good examples of the range of designs now available in this material*

*Plastic panels surrounding posters on footbridge*

CHICHESTER Station in the Southern Region of British Railways has been reconstructed, and we illustrate the covered footbridge and the ticket hall of the new building.

As shown in the illustration, the footbridge provides ample walking space and lighting in which the large-panel advertisements surrounded by Warerite plastics are displayed to good effect. Spaciousness is also a feature of the fine ticket hall illustrated below.

This room can be entered from the Up platform by stairs from the footbridge or by glass doors giving access from station yard and car-park. Above the ticket offices is a 35 ft. x 20 ft. mural decoration of powder blue "Hedgerow" Warerite, and incorporating a clock with a face of the same material.

### Novel use of Acoustic Board

The ceiling, some 30 ft. above the level of the terrazzo paved floor, presents a variation from the orthodox use of acoustic board. Acoustic boards have been effectively placed within honeycomb plaster and painted alternately in light grey and red. Laminated plastics provide additional colour and yellow and black "Apia," a design from the Warerite "Architectural" range, has been used for panelling the wall separating the main glass doors from the very big window above. The "Apia" design was also used to surface the inner ends of three timetable and advertisement stands. Beneath the ticket counters are glazed tiles of black and yellow.

Elsewhere on the station another Warerite pattern—"Arborea"—has been used, either in pink or in white, on screens, on footbridge, and in the two buffets. This design depicts leaf skeletons on a plain black background. Extensive use also has been made of "Red Maze," notably in the small hall on the Down side, where it not only provides decoration, but also conveys information and instructions to passengers. White lettering has been incorporated within the plastics to give clarity and indelibility.

The station was redesigned by Mr. H. Pittaway, Architect, Southern Region, and rebuilt by R. Corben & Son Ltd., of Southampton, under the supervision of the Southern Region's Chief Civil Engineer, Mr. A. H. Cantrell, M.I.C.E.

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IMPROVEMENTS TO STATION WAITING ROOMS AT BRADFORD EXCHANGE.—As part of the first stage of a comprehensive scheme to improve the passenger amenities at Bradford Exchange Station, British Railways, North Eastern Region, work has started in the general, and ladies' waiting rooms, both of which are to be redecorated, renovated and refurnished. Fluorescent lighting will replace the old gas mantles. Both rooms will have new furnishings, linoleum, and wall decorations. The ladies' accommodation is being rebuilt to include new toilets, washbasins, and mirrors. The work is being carried out by F. & J. Watkinson, Bradford, under the direction of the Chief Civil Engineer, North Eastern Region, British Railways.

*Ticket hall, showing novel use of acoustic board in ceiling*

# Mobile Soil-Testing Laboratory

*Believed to be the first of its kind on British Railways, this laboratory helps to reduce building costs and give greater site control*

*Mobile laboratory for scientific testing of earth samples*

THE Chief Civil Engineer's Department of the North Eastern Region of British Railways has recently acquired a caravan trailer specially designed as a mobile soil-testing laboratory. The road trailer, which was constructed to the Region's special requirements by Balmforth Caravans Limited, is normally drawn by a diesel-engine Land Rover. The interior is fitted with benches and cupboards as a compact self-contained laboratory and contains complete apparatus for conducting a full range of soil tests.

This mobile unit has been developed to serve the growing number of construction works now proceeding in all parts of the Region as a result of modernisation. By taking the apparatus to the site, soil-testing is more thorough and speedy than when samples have to be sent to the main laboratory. This in turn reduces building costs and gives more effective site control.

The trailer is 11 ft. in length. Its largest item of equipment is a 3-ton capacity tri-axial testing machine, used for compression-testing of clay specimens. A light version of a standard type used in soil-testing, this machine is designed to maintain pressure all round the sides of the specimen while the end-load is applied. This is effected by enclosing the 1½-in. dia. specimen under water pressure in a glass-walled hydrostatic cell.

### Variable Water Pressure

Water pressure, applied by pneumatic foot-pump, can be varied up to 120 lb. per sq. in. The specimen is held in a rubber membrane to prevent water permeation. End-load up to 5,000 lb. is applied vertically through gearing and provides a reading on a proving ring mounted above the apparatus. The shear strength or cohesion value of the clay can be calculated from the reading recorded when the specimen collapses. The machine is a portable unit that can be used in the main laboratory at York when the mobile laboratory is not in use, and is fitted both for manual and power operation.

Tests of this kind are principally of value in determining the type of foundation or depth of piling to be used for heavy structures.

A light hand-operated drilling rig is used in association with the mobile laboratory for obtaining undisturbed earth samples to a depth of 50 ft.

The laboratory also undertakes compaction testing of many grades of filling materials obtained from collieries and ash tips, and used in making up ground levels, particularly in connection with the new marshalling yards. These tests are carried out at intervals as filling proceeds and permit a very close degree of inspection and site control. A thermostatically-controlled oven for drying samples and fine-meshed sieves (down to 200 meshes per in.) to determine grain size are provided.

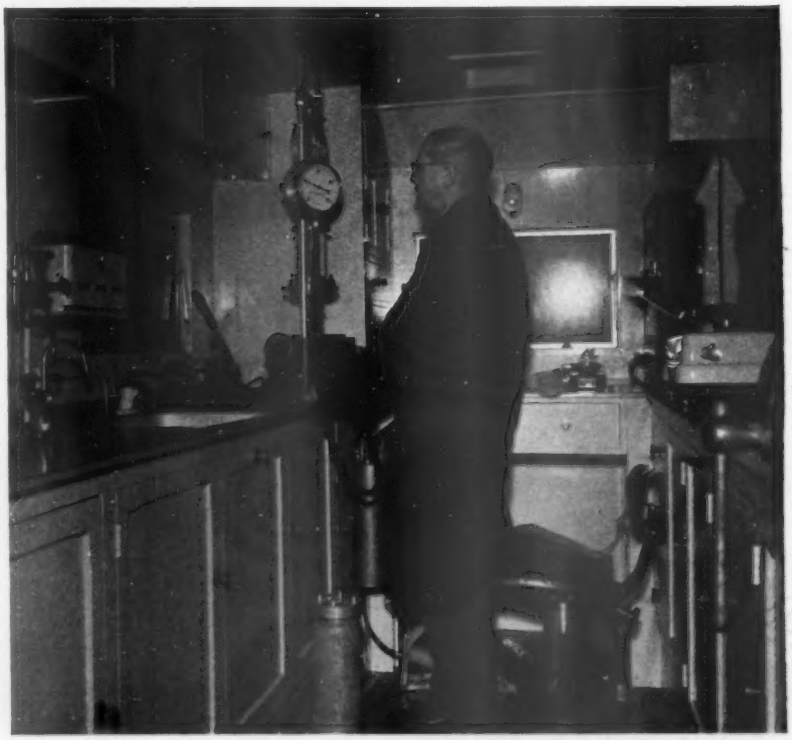
The laboratory also is equipped with a chemical balance and a 10-kg. balance. These are used for sample analysis and determination of moisture content. Before travelling, the chemical balance is dismantled and the balance damped and secured to the wall of the trailer.

### Ancillary Equipment

Other items include a water heater, bunsen burners, and a convector heater to heat the laboratory in cold weather which, together with the oven, are all fed by Calor gas. Electric lighting is maintained by 12-V. batteries. Two lockers are supplied for spades, earth augers, and associated equipment, and a third contains the Calor gas supply.

The rear space in the Land Rover is large enough to convey a small gang of men with loose equipment and tools.

The North Eastern Region's incursion into soil mechanics is comparatively recent, resulting from the much-increased scale of construction work arising from modernisation. A permanent building is under construction for the main laboratory that has been established by the Chief Civil Engineer at York. The mobile laboratory is an original development and believed to be the first of its kind on British Railways.



*Member of the laboratory staff operating the tri-axial testing machine*

# RAILWAY NEWS SECTION

## PERSONAL

Mr. J. W. S. Pegrum, General Manager, Rhodesia Railways, who, as recorded in our November 18 issue, is retiring from that position, was born in 1899, and joined Rhodesia Railways in 1925 after war service with the Royal Navy. In 1927 he was appointed Station Foreman at Amatongas, subsequently becoming Stationmaster at Dondo and, later, a Traffic Inspector, in which capacity he served at Broken Hill, Beira, and Bulawayo from 1933 to 1939.

*Mr. J. W. S. Pegrum*
General Manager, Rhodesia Railways, who is retiring

*Mr. J. H. Allen*
Appointed General Manager, Rhodesia Railways

Mr. Pegrum became Stationmaster at Broken Hill and, in 1943, Stationmaster at Bulawayo. In 1945 he was appointed Assistant Operating Superintendent, Broken Hill, and, in 1948, District Superintendent. He became Deputy Chief Superintendent of Transportation in 1952 and Chief Superintendent in 1954. His appointment as Deputy General Manager dates from March 1, 1956. During the African Railway Workers' strike in 1956, he acted as General Manager and was promoted to that position in August, 1957.

The late Mr. A. W. Arthurton, formerly Secretary, British Railways Press Bureau, whose death at the age of 88 was recorded in our December 2 issue, began his career with the Great Western Railway in the District Agent's Office, Norwich, in 1888. He was transferred to the Chief Goods Manager's Office (Rates Section) at Paddington during the revision of rates and charges following the Acts of 1891 and 1892, and served under the late Sir Joseph Wilkinson. In 1907 he was transferred to the General Manager's Office under the late Sir James Inglis and was associated with Sir Felix (then Mr.) Pole in the production of the Great Western Railway Magazine and in other directions. He was responsible for the conception of the Great Western Railway Lecture & Debating Society, and acted as secretary of the society until succeeded by the late Sir Felix Pole. In 1910 he went to South Wales and gained experience in traffic working in the Swansea District, but in 1914, he returned to Paddington and was attached to the office of Superintendent of the Line where, under the late Mr. Charles Aldington, he acted as examiner in signalling throughout the system. He was also secretary of the G.W.R. Rules & Regulations Committee and for some years attended the Railway Clearing House with the late Mr. E. A. Bowden. In 1922, Mr. Arthurton assumed control of the organisation which was later to be known as the British Railways Press Bureau. He was a Member of Council of the Institute of Transport and an Associate of the Institute of Journalists.

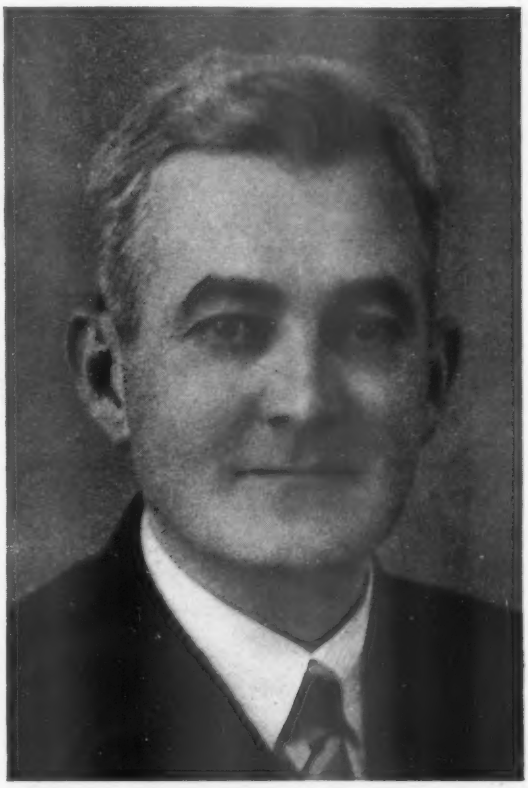
Mr. J. H. Allen, Deputy General Manager, Rhodesia Railways, who, as recorded in our November 18 issue, has been appointed General Manager of that system, was born at Claremont in the Cape in 1905. Before joining the Rhodesia Railways as a clerk, in the General Manager's Office in 1928, he spent five years with the South African Railways. In 1949, Mr. Allen was appointed Rates Assistant, and became Commercial Assistant and subsequently Commercial Superintendent in 1950. In 1951 he was appointed to the position of Deputy Chief Superintendent of Transportation (Commercial). Following the decision to set up a Commercial Department, Mr. Allen became the first Chief Commercial Manager in February, 1954. Two years later there was a considerable reorganisation of senior appointments and Mr. Allen returned to the General Manager's Office to fill the newly-created appointment of Principal Executive Officer (Movement). He was appointed Deputy General Manager in January, 1958. In this capacity, between June and October this year, Mr. Allen undertook a study tour of British and a number of Continental Railway systems, and also certain world-wide commercial and industrial enterprises. Mr. Allen has served as a Chairman of the Public Relations Advisory Board and a director of the Central African Rhodes Centenary Exhibition (1953). During the 1936 Empire Exhibition at Johannesburg he was in charge of the railways stand and was also Assistant Commissioner for the Rhodesia Pavilion. He has served on various Committees connected with the political and cultural life of the country and is a Commissioner of Oaths.

Mr. I. M. Malcolm, Assistant Chief Civil Engineer, New Zealand Railways Department, who will retire in January, joined the railway service in 1921 as a civil engineering cadet at Wellington. After working at Inver-

cargill, Dunedin and Christchurch, he was promoted in 1937 to First Assistant Engineer in the District Engineer's office, Wellington, and in 1938 was appointed First Assistant Engineer (Design) in the Chief Civil Engineer's office. In 1945 he became Assistant District Civil Engineer at Dunedin, where he remained until he was appointed Resident Engineer at Invercargill in 1948. In 1951 he was promoted to be Inspecting Engineer attached to the Chief Civil Engineer's office at Wellington, and in 1955 to the position of Assistant Chief Civil Engineer. Mr. Malcolm is an associate member of the Institution of Civil Engineers and a member of the New Zealand Institution of Engineers.

Mr. H. W. Hadaway, A.M.I.E.E., M.I.R.S.E., Senior Executive Assistant, Signal Engineer's Department, London Transport Executive, who, as recorded in our November 18 issue, has been appointed a Principal Executive Assistant in the Signal Engineer's Department with the title of Installation Engineer (Signals), responsible for installing, testing and passing out new installations and major renewals of all types of signalling equipment, joined the London Electric Railways in May, 1927, as a Signalling Apprentice and shortly after completion of his apprenticeship was appointed a Technical Assistant. He became an Executive Assistant in 1946 and a Senior Executive Assistant three years later. He was awarded a Thorrowgood scholarship by the Institution of Electrical Engineers in 1935. He is a member of the council of the Institution of Railway Signal Engineers and in 1950 was awarded the Institution's first prize for his paper on "Improvements in Track Circuit Shunts." In the same year, the Institution of Railway Signal Engineers published his paper on "Principles of Power Point Control & Detection."

*Mr. G. H. Binnie*
Chief Mechanical Engineer, Nigerian Railway Corporation, 1958-60



*Mr. G. J. Harris*
Regional Accountant, British Railways, London Midland Region, who has retired

Mr. G. H. Binnie, M.I.Mech.E., M.I.Loco.E., Chief Mechanical Engineer, Nigerian Railway Corporation, who, as recorded in our November 4 issue, has retired, began his railway career as a Premium Apprentice in the Locomotive Works at Swindon, on the former Great Western Railway. In 1932, after eight years at Swindon, he entered the service of the Indian State Railways, and was posted to Burma as Assistant Locomotive Superintendent. He served in the Indian Engineers in India and Burma from 1942 to 1946, commanding a railway operating company. From 1946-47 he was Works Manager & District Mechanical Engineer on the Burma Railways. He was then appointed Railway Mechanical Engineer of the Aluminium Development Association. At the beginning of 1949 he was appointed Works Manager on the Nigerian Railway, and became Assistant Chief Mechanical Engineer in 1954. Four years later he was promoted to be Chief Mechanical Engineer.

### The Institution of Locomotive Engineers

The following have been entered on or transferred in the Register of the Institution of Locomotive Engineers:—

*Members*

Mr. H. J. H. Nethersole, General Manager, Traction Division, English Electric Co. Ltd.; Mr. D. V. Reddy, Chief Mechanical Engineer, Southern Railway of India; Mr. A. Towle, District Mechanical Engineer 1, East African Railways & Harbours.

*Associate Members*

Mr. T. A. J. Lamb, Factory Manager, Marston Excelsior Limited; Mr. R. C. Coulton, Assistant Chief Mechanical Engineer, Tharsis Sulphur & Copper Co. Ltd., Spain.

Mr. G. J. Harris, M.Inst.T., Regional Accountant, British Railways, London Midland Region, who, as recorded in our December 2 issue, has retired, joined the former L.N.W.R. Chief Accountant's Department at Euston in 1915 and from 1917 to 1919 he served with the London Rifle Brigade. He then returned to railway service and, after general experience in the Accountant's Department, he was transferred to the Office of the Controller of Finance & Statistics, L.M.S.R., in 1930. In 1935 he was appointed Senior Investigator, Executive Investigation Office, Euston, and three years later he became Accountant, L.M.S.R., Northern Counties Committee, Belfast. In 1945 he was seconded to the Control Commission for Germany (British Element), Railways Branch, Transport Division, as Chief Control Officer (Finance & Statistics) and returned to the L.M.S.R. in 1947 as Assistant to the Chief Accountant. He was promoted to the position of Regional Accountant, London Midland Region, Euston, in 1949, the appointment from which he has now retired.

Mr. R. Shervington, Assistant District Traffic Superintendent, Woking, British Railways, Southern Region, who, as recorded in our October 14 issue, has been appointed Traffic Superintendent, South Eastern Division, joined the Southern Railway in 1934. After a short time at stations he spent a year in the Audit Accountant's Office and in

*Mr. R. Shervington*
Appointed Traffic Superintendent, South Eastern Division, Southern Region

*Mr. A. K. Dytch*
Appointed District Traffic Superintendent, York, North Eastern Region

*Mr. W. H. Hardy*
Appointed District Goods Manager, Warrington, London Midland Region

1936 he was transferred to the Superintendent of Operation's Timetable Section, Waterloo. From 1939 to May, 1946, he served in the King's Royal Rifle Corps, the Royal Engineers, and the Indian Engineers. He was posted to India in 1942 and, after learning Urdu, was Chief Yardmaster, Chittagong, and Operating Officer and Locomotive Running Officer in those areas of the East Bengal Railways which were under military operation. In 1944 he left Railway Transportation and, after a course in seamanship and navigation, became captain of a small armed steamship on the Arakan coast of Burma. In 1946 he returned to the Southern Railway in the Freight Stock and, subsequently, the Electric Rolling Stock Sections. From 1947 to 1949 he worked in the London East Divisional Superintendent's Office, British Railways, Southern Region, and in 1949 he was appointed Assistant to the London West Divisional Superintendent. In 1954 Mr. Shervington became Assistant District Traffic Superintendent, Southampton, and in 1955 Assistant District Traffic Superintendent, Woking, the position he has now vacated.

We regret to record the death on December 3 of Mr. J. J. Finlayson, Chief Mechanical & Electrical Engineer, British Railways, Scottish Region.

Mr. W. Willmott, Stationmaster, Cannon Street, British Railways, Southern Region, has been appointed Stationmaster, Charing Cross, Southern Region.

Mr. G. Carruthers, Eastern Area Traffic Superintendent, Eastern Counties Omnibus Co. Ltd., has been appointed Traffic Manager of Wilts & Dorset Motor Services Limited.

Mr. A. I. Helm, Plant Engineer, The Skefko Ball Bearing Co. Ltd., Luton, has been appointed Works Manager of the new factory proposed by the company at Irvine, Ayrshire.

Mr. A. K. Dytch, Acting Assistant Motive Power Officer, British Railways, North Eastern Region, who, as recorded in our December 2 issue, has been appointed District Traffic Superintendent, York, was educated at Doncaster and Rutherford (Newcastle) Technical Colleges, and completed a premium apprenticeship at Doncaster Locomotive Works in 1935. From then until 1941 he served as a Technical Inspector at various motive power depots in the north-east of England. From 1941 to 1943 he occupied the positions of District Inspector, Darlington; Headquarters Technical Inspector, York; Mechanical Foreman, York Motive Power Depot; and Locomotive Shedmaster, West Hartlepool. In 1946 he was appointed Assistant District Motive Power Superintendent, Hull, and a year later became Technical Assistant to the Motive Power Superintendent, York. He was appointed General Assistant to the Motive Power Superintendent, York, in 1950, and was transferred to Wakefield in 1956 as District Motive Power Superintendent. He returned to York in 1959 as Acting Assistant Motive Power Officer, North Eastern Region, the position he now vacates to take up his new appointment.

Mr. A. B. Skevington has been appointed Branch Manager of the Nottingham Branch of Philips Electrical Limited.

Sir Samuel R. Beale, Chairman, Worthington-Simpson Limited, has retired. He is succeeded by Mr. P. B. H. Brown.

Mr. R. L. Moorcroft, Principal Assistant Architect, British Transport Commission, has been appointed Architect, Chief Civil Engineer's Office, Paddington, British Railways, Western Region.

Mr. A. F. Miller and Mr. S. McD. Gemmell have been appointed, respectively, Managers of the Glasgow and Aberdeen branches of British Insulated Callender's Cables Limited.

Mr. W. H. Hardy, Head of Freight Section, Divisional Traffic Manager's Organisation, Liverpool, British Railways, London Midland Region, who, as recorded in our December 2 issue, has been appointed District Goods Manager, Warrington, began his railway career with the former L.N.E.R. in 1925, and received his early training in the Goods department at Burton on Trent and Lincoln. In 1936 he became Assistant District Canvasser at Peterborough, and returned to Peterborough as Assistant Goods Agent after serving as an officer with the R.A.F. from 1942-1946. His war experience included service in Burma, Malaya and North Borneo. From 1948 he held positions at Nottingham and Derby, and in 1955 was appointed Chief Transit Clerk in the Liverpool District Goods Manager's Office. In 1957 he became Operating Assistant to the Liverpool District Goods Manager, and in April, 1958, Head of the Freight Section in the newly-formed Divisional Traffic Manager's organisation at Liverpool, the position he leaves for his new appointment.

Mr. E. J. Hunter has been appointed a Director of the Consett Iron Co. Ltd.

Mr. A. S. Gill has retired from the board of George Cohen, Sons & Co. Ltd.

Mr. R. E. M. Holmes has been appointed Sales Manager of Pantak Limited.

Mr. F. King, financial controller of Formica International Limited, has been appointed a director of Formica Limited.

Sir John Green has announced his resignation from the boards of The Staveley Iron & Chemical Co. Ltd., Staveley Estates Limited, and the Sheepbridge Co. Ltd.

Mr. A. S. D. Barrett has been appointed consultant to Research & Control Instruments Limited, and has joined the board of the company.

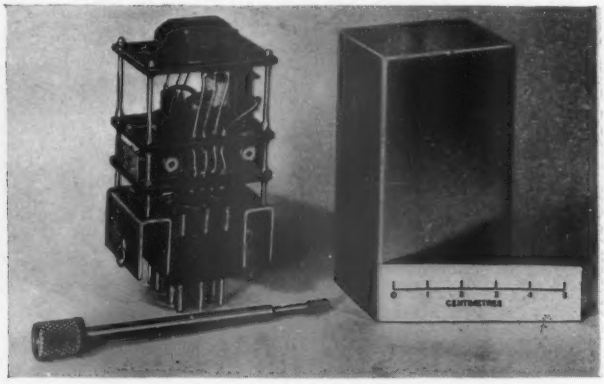
Mr. M. G. Guthrie has been appointed Publicity Manager of the Automative & Industrial Products Division of the Westinghouse Brake & Signal Co. Ltd.

Mr. E. M. Thomas has been appointed Resident Representative in Hull, of the Machinery Division of George Cohen, Sons Co. & Ltd.

Mr. J. B. Spence has been appointed to the board of Lancashire Dynamo & Crypto Limited, a member of the Metal Industries Group. He succeeds the late Mr. C. F. Jackson.

Mr. P. T. Stephens has been appointed Deputy-Chairman of the board of Saunders Valve Co. Ltd. Mr. P. C. E. Rose, an executive director of the company, has been appointed General Manager of the Industrial Divisions of the company.

# NEW EQUIPMENT AND PROCESSES



## Electronic Signal Interlocking

THE first instance of electronic interlocking on British Railways will replace mechanical interlocking on the lever frame at Henley-on-Thames signal box in the Western Region during the early summer of 1961.

The technique which uses solid-state electronic circuitry, eliminates the need for moving parts and thus greatly reduces long-term maintenance costs. It works on the conventional " entrance-exit switch-and-push button " system, and track and point indication is provided. The only relays used are track relays.

A working model of a typical double junction completely controlled by the system is shown in the left-hand illustration above. The control panel incorporated functions in the manner normally used for electric interlocking systems. The full size electronic logic units used are beneath the transparent cover in the foreground. The upper right-hand illustration shows one of the plug-in logic units with cover removed.

To set up the route B to D (see Fig 1 below), the direction switch at B is set to direction B to F and the exit button at D is pressed. This action results in the points 100 and 101 being moved to the reverse position. These points are interlocked and the sequence is that 101 is reversed first and when it has been detected as being reversed, the points 100 are reversed. This route can only be called provided that the information from the track circuits involved indicates that there is no vehicle on the track and also that the points are not locked—that is to say, that a prior route has not been set up along, for instance, E to A.

A simplified example of a sequence of events is shown in Fig. 2.

The pulse from the push-button at D is fed to an " Or " gate which sets up a feed-back path to maintain the circuit. The output from the " Or " gate is fed, together with the signal from the switch at B, to the " And " gate which then gives an output to the first track circuit " And " gate. This input, together with the input from the track circuit (provided this is clear), will result in an output to the next track circuit "And" gate and so on. After all the track circuits have given the unoccupied signal, the points 101 are reversed, provided they are not locked and the signal from the track circuits together with the information that 101 is now reversed and locked is fed to another " And " gate. The points 100 are now reversed and locked and this information, together with the output from the last "And" gate, is fed to the final " And " gate, the output of which clears the signal at B (see Fig. 1).

If the required information does not reach any one of the " And " gates in the chain, the sequence will be broken and the route will not be cleared. When the route has been cleared and the train travelling in the direction B to D, for example, has passed over the first track circuit in the route, the signal is automatically returned to red. Although the direction switch is still set, this route cannot be used again by pressing the exit button until the whole sequence of calling has been repeated.

In addition to the interlocking of the points and the use of track circuits, there is also a device whereby, if a signalman has set up a wrong route, he is unable to reset the route immediately if a train has already entered the approach track circuits. He can set all the signals to red and, after a suitable time delay to allow the train to stop, the route can be reset.

The system can therefore provide an anti-preselection device and an approach locking device to meet signalling requirements.

Track circuits of the normal type are used.

The electronic logic units are all of the plug-in type. They are designed to operate safely in ambient temperatures between −20 deg. C. and +50 deg. C. They employ Mullard transistors, semi-conductor diodes, and ferrite cores.

The " fail-safe " electronic technique outlined is based on the experience of the maker in the application of modern electronics to safety problems. The present equipment has been designed to meet the requirements of British Railways, but it is generally applicable to railway systems anywhere in the world.

Further details can be obtained from Mullard Equipment Limited, Mullard House, Torrington Place, London, W.C.1.

## Brake Bonding Adhesive

REDUX 68 is a new addition to the range of brake bonding adhesives specially developed for all types of friction materials to operate at bond line temperatures over 350 deg. C. It is also capable of filling a gap of up to ·05 in. between components without appreciable reduction in strength. These special properties make Redux 68 suitable for heavy transport and public service vehicles.

Further details can be obtained from C.I.B.A. (A.R.L.) Limited, Duxford, Cambridge.

## Fork-Lift Contract Hire Scheme

GEORGE COHEN, SONS & CO. LTD., a member of the 600 Group, is extending its plant hire scheme by offering fork-lift trucks on contract hire for the first time in Britain.

The contract covers all aspects of maintenance, relieving the hirer of the costs of providing his own service and repair facilities, also the provision of " stand-in " trucks to take over in the event of breakdowns. Further, existing trucks can be purchased and replaced progressively by the latest machines.

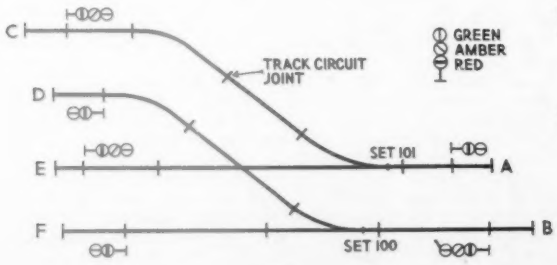



FIG. 1

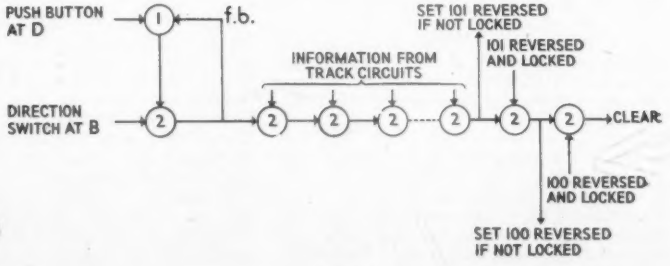



FIG. 2

The scheme can be entered into immediately without further capital expenditure, and the full amount of the payments under the contract is allowable as a business charge for income tax purposes.

The new scheme, which is to commence this year, has been prepared by George Cohen's in collaboration with a leading producer of fork-lift trucks, Coventry Climax Engines Limited.

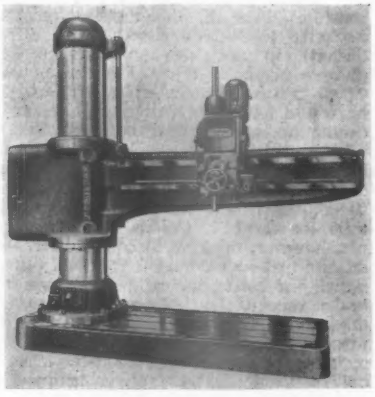
Further details of the scheme can be obtained from George Cohen, Sons & Co. Ltd., Wood Lane, London, W.12.

## Stainless-Steel Electrode

THE Super Stainees electrode has recently been added to the English Electric range of stainless-steel electrodes. It is claimed that the cost of welding stainless steels is reduced by the use of a heavy electrode coating containing metallic powder, which allows a deposit to be made of up to 50 per cent more metal than is obtainable from conventional electrodes.

The electrode is used with the "touch" technique and, in the lighter gauges, is suitable for use in all positions. There is hardly any spatter and slag is easily removed. It may be operated on a.c. at over 70 V., or on d.c. with the electrode positive.

Further details may be obtained from the English Electric Co. Ltd., English Electric House, Strand, London, W.C.2.



## Pre-Select Speed Drilling Machine

THE principal feature of the Archdale range of medium-duty radial drilling machines, Nos. 14821–14823, is the facility for the pre-selection of spindle speeds while the spindle is running or is stationary.

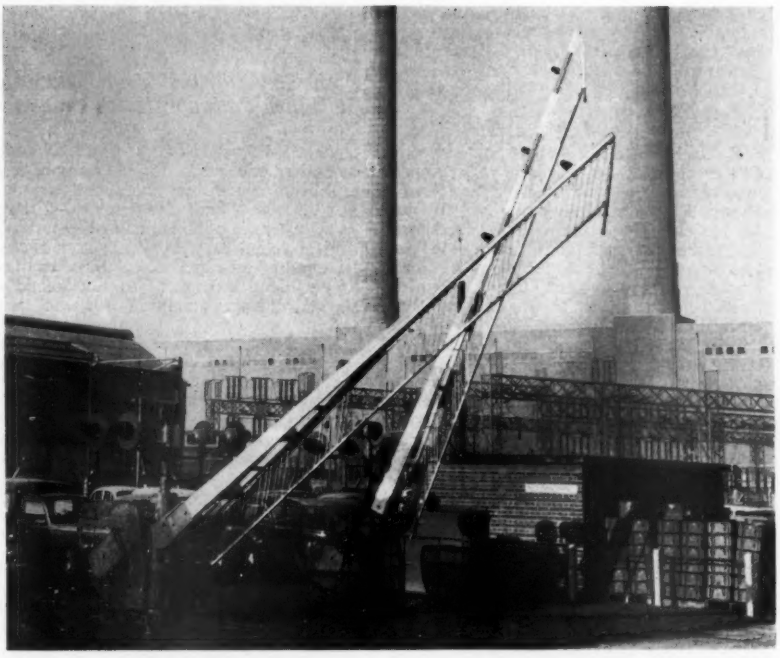
Any of the 16 available spindle speeds is selected by rotating a control knob on the saddle. The actual change of speed is subsequently affected by moving a lever forwards and then backwards to its original position, thereby stopping the spindle and restarting it at the new selected speed. The time required for speed changing is thus reduced to a minimum.

The spindle speed ratio is 100: 1, and there are 12 rates of automatic feed. Starting and reversing the spindle is effected by a multi-disc clutch without stopping the motor, and an automatic brake stops the spindle quickly and prevents creeping.

Provision is made for drilling to a predetermined depth within the full spindle traverse of 15 in., with automatic trip.

The drilling capacity is up to 3 in. dia. in mild steel, and the three sizes in the range have 8 ft., 9 ft., and 10 ft. spindle radius respectively, each of these having three alternative ranges of speed.

Further details may be obtained from James Archdale & Co. Ltd., Ledsam Street, Birmingham, 16, or from the sole selling agent, Alfred Herbert Limited, Coventry.



## Automatic Cutlery Washer

A CUTLERY washer, claimed to be highly successful in the United States, now is available in this country. The machine automatically washes, rinses, and dries cutlery in under four minutes.

The machine is a solidly-built compact unit, 2 ft. 6 in. by 1 ft. 4 in. by 3 ft. high, and is designed for easy maintenance. For access to working parts, only the front panel has to be removed. Hourly capacity is some 2,500 pieces.

Further details can be obtained from the manufacturer, Conveyor Cafeterias Limited, George Street, London, W.1.

## Lifting Barriers

THE Rotax electrically-operated lifting barrier installation has been developed primarily for service in railway level crossing schemes requiring an entirely automatic lifting barrier for track circuiting operation. The design of the installation is flexible and the barriers can be readily adapted to schemes requiring either treadle operation or electrical operation which is manually controlled. The latter scheme is being installed at Worthing Central, British Railways, Southern Region.

The installation consists essentially of two pairs of lifting barriers; one pair for facing traffic and the other for trailing traffic, two sets of front and rear twin red flashing lights, two sets of two-toned gongs, a control console, and a steel triangular structure for mounting the battery, charging units, control relays, terminals, and fuses.

Simplicity of operation is confined to the small control console which is installed in the signalbox. On being warned of a train's approach, the operator presses the various push buttons in a sequence according to the relevant circumstances. Particular attention has been paid to safety features in the design of the barrier. If one is crashed, the boom cannot be motored up and little damage is sustained by the barrier or vehicle, because the steel pin which holds the wooden barrier in position is normally the only item to require renewal. Over-load protection is incorporated which ensures that, if a boom comes into contact with a vehicle, the current is automatically tripped so that the boom can be lifted by hand. A collapsible skirt can be fitted as an extra to each boom to prevent children or animals straying on to the track. The accompanying illustrations show a test installation of barriers at the works of the manufacturer, and a control console.

Further details can be obtained from the manufacturer, Rotax Limited, Willesden Junction, London, N.W.10.

# Ministry of Transport Accident Report

*Between Garforth and Micklefield, April 25, 1960: British Railways, North Eastern Region*

Colonel J. R. H. Robertson, Inspecting Officer of Railways, Ministry of Transport, inquired into the collision, which occurred at about 9.18 p.m. between Garforth and Micklefield. On a fine clear night, shortly before the onset of full darkness, the 9.0 p.m. Leeds-Hull six-car multiple-unit diesel passenger train ran into the back of an unfitted freight train, which was running ahead of it under clear signals. The diesel train had previously passed an intermediate block semaphore signal, which was standing at danger.

The leading bogie of the diesel train was derailed, and the front of the leading coach was stove in. The driver was slighlty injured, and five out of the 30 passengers were injured sufficiently to require hospital treatment, but the last was discharged on April 30. The heavy brake van of the freight train and the two wagons immediately in front of it were derailed, the train becoming divided immediately ahead of them. The guard received head injuries, and was detained in hospital until April 28. The emergency arrangements were prompt and all the injured had left for hospital within an hour of the collision. Normal working was resumed some 9½ hr. after the collision.

The relevant signals are shown in the following table. The figures opposite each show the distance to the next signal :—

| | |
|---|---|
| Garforth distant (No. 30) | 998 yd. |
| Garforth outer home (No. 27) | 489 yd. |
| Garforth inner home (No. 28) | 441 yd. |
| Garforth starter (No. 29) and I.B.S. distant (No. 32) | 918 yd. |
| Intermediate block signal (No. 31) | 1,217 yd. |
| Peckfield distant signal and Micklefield outer distant signal (slot) | 460 yd.* |

*To point of collision.

The driver has a good view of signals 27 and 28, but signals 29 and 32 do not come into view until he is half-way between signals 27 and 28. On passing signals 29 and 32 he gets an intermittent view of signal 31, but owing to curvature, a bank, trees and a cottage he does not get an uninterrupted view of this signal until he is just within 400 yd. of it. From about 175 yd. past signal 31 there is a falling gradient, first at 1 in 191 for 450 yd. and then at 1 in 147.

### Type of Signalling

Standard three-position block is worked on this line. At the time of the accident Peckfield signalbox was switched out, and Garforth was working to Micklefield. I.B.S. 31 is worked from Garforth, subject to a "line-clear" release—one release, one pull. At Micklefield, Welwyn control is in operation, so that a train has to enter and clear the home signal berth track-circuit, before a second train can be accepted. At Garforth sequential locking between the stop signals is in force. Also, before Garforth can accept a train from the rear, the distant and outer home signal arms must be proved "on," and the outer home signal lever locked in the normal position. At the time of the accident the Garforth distant signal was out of order, and so maintained at caution. After the accident, tests first by the York Chief Signal & Telegraph Inspector and then by Colonel Robertson established the integrity of the signalling.

The Garforth signalman described how he had signalled the freight train through in the normal way. On replacing his signals to danger behind it and giving "train out of section," he was offered and accepted the diesel train. When the freight train had cleared the track-circuit immediately beyond signal 31, he pulled off signals 27, 28 and 29, as he was entitled to do. He had previously checked from his repeaters that signals 31 and 32 were "on." He emphasised that he could not have pulled off signal 29 unless the arm of signal 31 was "on." Nor could he have pulled off signal 31 for the diesel train, as his block instrument to Micklefield still showed "train on line" for the freight train.

The diesel train passed him at its normal speed of about 45 m.p.h., and he soon saw that it was not slowing for signal 31. When he saw from the indications on his diagram that it had passed signal 31, he at once sent "train running away on right line" to Micklefield, and then rang up the Micklefield signalman to say what had happened. On receiving this bell signal, the Micklefield signalman looked up the line, and saw that the freight train had already passed his outer distant signal. He at once put it back to "caution." After receiving the telephone call from Garforth, he saw that the freight train was nearing his box and whistling to attract his attention. Noticing the absence of a tail lamp and the damaged state of the last wagon, he sent "stop and examine" to the box ahead (Church Fenton).

The driver of the freight train said that on approaching Peckfield at about 25 m.p.h. he felt a heavy bump in rear. He looked back and found he could no longer see the brake van's side lights. He quickly came to feel that something serious had happened, but thought it best to keep moving. He whistled as he passed Micklefield, and was stopped at Church Fenton. He said that he had had no difficulty in observing any of the relevant signals, and that signal 31 was showing a good light.

### Tests on Signals

Before taking evidence from the driver of the diesel train, Colonel Robertson told him that all the previous evidence and tests showed that signal 31 must have been at danger when he passed it. The driver was reluctant to believe that he had passed a signal at danger, but Colonel Robertson is sure that his subsequent evidence was true and intended to be helpful. The driver was sure that signals 27, 28, and 29 were "green," but said that through a signalman's dilatoriness in pulling off, it often happens that "you get the distant signal 'on' and the others 'off'." He could not remember seeing the arm or light of I.B.S. distant 32, and Colonel Robertson formed the opinion that he could not really remember seeing signal 29 either. He was rather vague about the position and aspect of signal 31. He said that if he passed it, it must have shown "green," but Colonel Robertson does not think he could really remember seeing it.

He remembered seeing the Peckfield distant signal at "green." Just after passing it, he saw the three lamps on the brake van of the freight train ahead, and at once made an emergency brake application. He thought his speed had dropped to between 30 and 40 m.p.h. before the collision. He had been on the footplate for 37½ years, and had been a driver for 14 years. The last four years he had been on diesels which he preferred to steam locomotives. He had an absolutely clean record, was in good health with satisfactory eye-sight, and on and before this run had had nothing to worry or distract him.

Colonel Robertson had tests carried out to show how soon the driver of the diesel should first have seen the side and tail lamps on the brake van of the freight train ahead, and how soon an immediate emergency brake application should have brought the diesel train to a stand. He concluded that the diesel's speed of 55 m.p.h. (its guard's estimate was 50 m.p.h.) should have been reduced to the freight train's speed of 25 m.p.h. within a distance of 280 yd. In Colonel Robertson's opinion, the diesel driver must have had the brake van lights in view for about 14 sec. while still far enough away from them to have been able to avoid the collision by emergency braking.

### Inspecting Officer's Conclusions

Colonel Robertson is satisfied that the signalling of the two trains was carried out correctly, and that signal 31 was showing a good red light when the diesel train passed it. Therefore, the driver of this train was solely responsible for the collision, first because he ran past this signal at danger, and second because he was not sufficiently alert to see the side and tail lamps of the brake van ahead in time to avert a collision.

Having seen green aspects in signals 27 and 28, the driver may have neglected to observe signal 29 (with signal 32 underneath it) on the unwarranted assumption that signal 29 must have been off, while the signalman had neglected to pull off signal 32 (the I.B.S. distant). In doing this the driver failed to observe his basic duty of observing each signal in turn. Had he looked at signal 29, he would have seen that signal 32 was at caution, and so would not have forgotten about I.B.S. signal 31. Alternatively he may have looked out for signal 31 and missed it, and then have mistaken the Peckfield distant signal, which was still off for the freight train, for signal 31. Colonel Robertson does not, however, think so, since the driver was definite that he indentified Peckfield distant signal just before seeing the lights on the brake van. Colonel Robertson does not think that the driver's knowledge of the road was insufficient or that he confused this sequence of signals with another. He can only conclude that the driver temporarily let his attention wander.

The extent of the damage to the freight train suggests that at their moment of impact the relative speed of the two trains was not less than 20 m.p.h. Adding this to the freight train's speed of 20-25 m.p.h., the diesel train must still have been travelling at upwards of 40 m.p.h. If this was so, the diesel train's driver must have had the brake van's lights in view for over 20 sec. before he applied his brakes.

The circumstances of this collision have been made known to the Medical Research Council which is assisting the British Transport Commission in an investigation into failures of this nature.

Colonel Robertson has no doubt that the installation of the Automatic Warning System on this section of line would have prevented the accident, as the driver would have heard the warning horn in his cab on approaching I.B.S. distant signal 32. In the North Eastern Region priority for the installation of A.W.S. has been given to the East Coast Main Line, running south to north between Shaftholme Junction and Marshall Meadows. The Leeds-York line, on which this accident occurred, has been included in the next list of main lines to be considered. Colonel Robertson does not consider that this line should be given any special priority.

# New Carriage-Cleaning Equipment

*North Eastern Region installations at South Gosforth and Heaton*

The North Eastern Region of British Railways demonstrated recently its new carriage-cleaning plant at the South Gosforth carriage sheds, Newcastle-upon-Tyne. This plant is the most modern and efficient of its kind and is being adopted as the pattern for carriage-cleaning depots throughout the Region. There is already a similar installation at Heaton, also in the Tyneside area. Both these new plants are now in full operation.

### Pneumatic Pressure

The equipment consists of a series of heavy duty nylon bristle brushes rotating at high speeds on upright spindles in association with the application of sprays of water and a cleansing agent. The rotating spindles are mounted on swing arms which hold the brushes against the body sides by pneumatic pressure. Compressed air at a pressure of 170 lb. per sq. in. is supplied to a cylinder in the brush pedestal and is governed by solenoid-operated valves. The positive scrubbing action on the coaches is considered to be much more effective than the mild rubbing of rotating cloth flails used in earlier types of washing plant. The brushes and sprays are arranged in three groups on either side of an open track leading from the running line to the carriage sheds. Coaches undergoing normal cleaning pass first through a group in which water and detergent are applied.

This group consists of an arched spray giving preliminary wetting and a pair of brushes and sprays applying the detergent solution. The coaches then pass to the next group consisting of three pairs of brushes rotating in alternate directions, followed by a further high-pressure water spray, and finally a special water mist window spray to eliminate streaks. The third group is for special periodic cleansing in which a mild acid solution is applied, followed by the normal washing process. Both the detergent and the final washing groups are automatically operated by the trains themselves by means of photo-electric cells.

### Water Supplies

In all the machines the spindles are driven by individual electric motors at 600 r.p.m. and a light shield is fitted to prevent splashing. In addition, to the direct high-pressure jets, each pair of brushes is watered by its own spray. The liberal use of water makes heavy demands on available supplies. Normal consumption of the washing machine operating in conjunction with either the detergent or the acid solution is 170 gal. per min. To relieve mains requirements the water is collected from the concrete aprons and filtered through a sump arrangement. Water thus reclaimed supplies over half the amount needed: mains water being used only in the final washing off operation.

### Control Apparatus

Water pressure at 110 lb. per sq. in. is maintained by electrically driven pumps housed in a special pump house which also contains an illuminated control panel governing the operation of the plant. In addition there are controls to govern the strengths of detergent and acid solutions. The normal solutions used are 1 per cent of Teepol for the regular detergent cleansing, and 5 per cent of Exmover for special periodic cleansing. The new plant at South Gosforth is washing about 200 electric and diesel multiple-unit coaches each day and giving special periodic cleaning to 20. A similar number of locomotive-hauled coaches are dealt with at Heaton. In addition to a much higher standard of cleanliness, considerable economies have been derived from the automatic operation of the new equipment. The plant was supplied and installed by Kullens & Company, of Reutlingen, West Germany, under the direction of Mr. M. G. Burrows, Chief Mechanical & Electrical Engineer, and Mr. E. L. Triffitt, Chief Civil Engineer of the Region.

# Maiden Voyage of Channel Islands Ship

British Railways, Southern Region, Channel Islands passenger ship *Caesarea* made its maiden voyage from Weymouth to Jersey and St. Malo on December 2. It has replaced *St. Julia* and *St. Helier* on the present service. For the new services next May it will be joined by its sister ship *Sarnia*, and *St. Patrick*, a post-war vessel now to be extensively refitted and brought up to the same standard of comfort.

The *Caesarea* is the biggest ship ever built for the Channel Islands routes and the largest which can be handled at St. Helier, Jersey. One-class accommodation is provided for 1,400 passengers. There are private cabins for 62 passengers, two de-luxe cabins and 22 sleeping berths in each of two lounges; one reserved for ladies and the other for gentlemen. Seats are provided, under shelter, for the full number of passengers who can be carried and the whole of the ship's accommodation, including the crew's quarters, is mechanically ventilated.

The *Caesarea* was launched on January 6, 1960, by Lady Coutanche, wife of the Bailiff of Jersey. Its sister ship, *Sarnia*, was launched on September 6, 1960, by Mrs. Arnold, wife of the Bailiff of Guernsey. The ships' names are the Roman names for the Islands. Both ships have been constructed by J. Samuel White & Company at Cowes, Isle of Wight.

# Parliamentary Notes

### Stedeford Recommendations

It was made clear once and for all in the House of Lords on November 30, that the recommendations of the Stedeford Advisory Group on British Railways are not to be published, and that the awaited Parliamentary White Paper will be a four-year programme from the British Transport Commission.

This information was drawn by Lord Morrison of Lambeth, one-time Labour Minister of Transport, when he asked H.M. Government " when they proposed to publish the Report of the Stedeford Advisory Group on British Railways, and how the Plan (Command 813) for the modernisation and re-equipment of British Railways will be implemented."

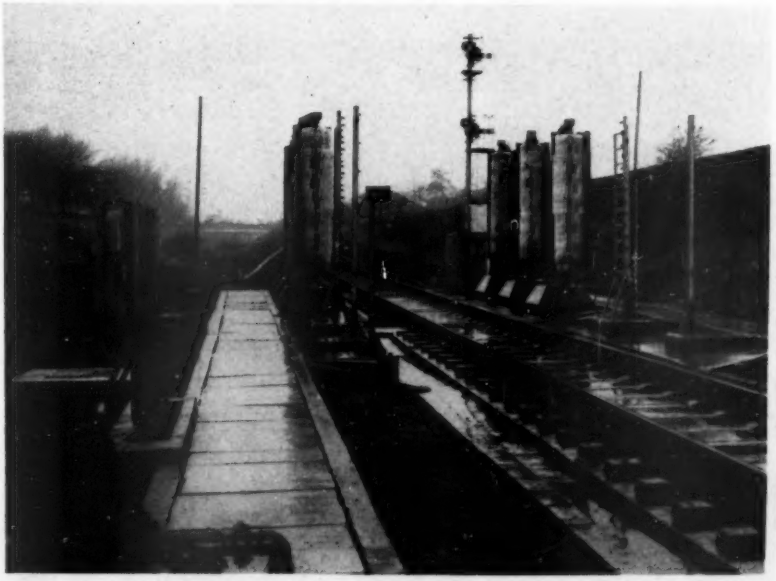
Lord Chesham, Joint Parliamentary Secretary, Ministry of Transport, replied:—

" My Lords, it is not intended to publish the recommendations of the Group. This was made clear by the Minister of Transport when the Group was set up, and in subsequent statements.

" On the second part of the noble Lord's question, the Minister of Transport is expecting shortly to receive from the British Transport Commission a four-year programme, on the preparation of which the Commission have for some time been urgently engaged. As soon as this has been received, the Minister of Transport will examine it and discuss its implementation with the Commission in the light of present and probable future needs.

### Critics " Inaccurate Thinking "

Lord Morrison of Lambeth: Can the noble Lord say when the report of the Stedeford Group was received and why it is not proposed to publish it ? This is a matter of public interest, whether it con-



*The new carriage-cleaning plant at South Gosforth, British Railways, North Eastern Region, showing the second group of sprays and brushes used for scrubbing and washing down*

cerns a publicly-owned or a privately-owned industry. Why is it not proposed to publish it and why is it proposed to publish only the proposals of the British Transport Commission? Does not the noble Lord think that this is an extraordinary state of affairs?

Lord Chesham: No, I do not think it is in the least an extraordinary matter; and I am surprised that the noble Lord should ask this question, because the matter was made clear by the Minister of Transport on April 13 this year in another place, by my fellow Parliamentary Secretary on October 26 in another place, by Lord Mills in your Lordships' House on November 7, and by the Minister again on November 9 of this year. But the noble Lord seems to be under some misapprehension, in that this Group has produced recommendations. It has not made a report at all.

Lord Morrison of Lambeth: Well, well!

Lord Chesham: What matters to Parliament, it seems to me, is the proposals which H.M. Government, after considering the recommendations and after consultations, will put to Parliament; and those will be forthcoming in due course.

Lord Morrison of Lambeth: Does it matter what the Minister of Transport said when he appointed this body? Does the noble Lord not think it is setting aside the public interest and, indeed, legitimate Parliamentary expectations if, after an investigation of this importance and character takes place in regard to the British Railways system, a matter which is of profound public importance, H.M. Government refuse to publish their report.

### Recommendations to be Confidential

Lord Chesham: It matters extremely what my right honourable friend said when he announced the setting up of this inquiry, because he made it perfectly clear at the time that the findings, the recommendations of this Group, were to be confidential to H.M. Government and to the British Transport Commission. The Group undertook its work in that light and witnesses gave evidence to the Group on that understanding; I do not think it is necessary in the public interest for the recommendations of the Group to be published.

### "A Scandalous Precedent"

Viscount Alexander of Hillsborough: I must say there seems to be little regard by H.M. Government for the responsibilities of Members of either House of Parliament; little regard at all. If what the noble Lord says is true, that H.M. Government have had no report but only recommendations, what is the basis of submissions by Ministers to the House, for the House to make a decision, in another place or here? On what basis do we come to consider the justice of the decisions of the Government unless we have what was in the minds of those concerned, and know the contingent factors. I think this is a scandalous precedent.

Lord Chesham: Again I am surprised to find that the noble Viscount should feel that such things are scandalous. I believe it has long been accepted by Parliament in this country that Ministers make statements to both Houses on their own responsibility, and that it is their own responsibility to justify those statements to the House; rather than to justify, the advice which has led them to come to those conclusions.

Viscount Alexander of Hillsborough: The noble Lord has still not dealt with the point as to how Parliament itself is to get at the facts. Are we to accept the word of the Minister that what he is saying is not disclosing the real views of the people who were interviewed by the Committee, or anybody else, but what H.M. Government wants to say to us?

Lord Chesham: Naturally, that is the whole process of the working of democratic Parliament.

A Noble Lord: On the contrary.

Lord Chesham: On the contrary, I think it is an accepted principle for a Minister to come to either House and make an announcement. It is then up to him to justify that; or it is up to the Members of either House to go on at him until he has justified it.

Lord Morrison of Lambeth: Does not the noble Lord agree that the Minister came to the House of Commons and announced the appointment of this body? Having done so publicly, surely the Minister cannot justify his own position without revealing the report and recommendations of the group concerned. Is it not monstrous, from the point of view of Parliamentary government and Parliamentary democracy, that a Minister should publicly announce in Parliament his decision to appoint a group or committee and then afterwards flatly refuse to give publicity to the report and recommendations of that committee?

Lord Chesham: My Lords, no — I believe it is quite right and proper for any Minister to come to Parliament and tell the House what he is doing to get on with his job.

### Four-year Plan

Lord Stonham: In view of the fact that H.M. Government approved in 1955 plans for the modernisation of British Railways, can the noble Lord say whether the new decision to ask British Railways for a four-year plan has anything to do with the recommendations made by the Stedeford Committee?

Lord Chesham: I think that when you are building a great enterprise over the years there must always come a time when you have to stand back and review your progress in company with your banker.

Lord Stonham: While appreciating what the noble Lord says about the Government's standing back from improving British Transport, will he now answer the question: has a new situation arisen concerning the recommendations of the Stedeford Committee?

### Minister's Prolonged Study

Lord Chesham: My Lords, I am always deeply grateful for advice from the Benches opposite. In this case, of course, it is redundant. The B.T.C. and my right honourable friend have been discussing this matter before the Stedeford Group was set up during the process of its work and since; and, therefore, certainly the recommendations will be under discussion. The whole matter is all one matter.

Viscount Alexander of Hillsborough: Are we to gather that out of this sort of arrangement we are now to come to a point where we receive a Minister's recommendation through the Stedeford Committee; where we are not to know what their real views are, while knowing about the mortal blow the Government have dealt at the British Transport Commission in a variety of ways from time to time. This hole-and-corner business will not redound to the credit even of a Tory Government.

Lord Chesham: I am a little at a loss to understand what mortal blow has been delivered. I thought that what the Government were trying to do was help the B.T.C. to put the railways on a modern and thoroughly efficient basis, and they enlisted the aid of the Stedeford Committee to help them do it.

### Supplementary Pensions for Railwaymen

Mr. George Rogers (N. Kensington—Lab.), Mr. H. Hynd (Accrington—Lab.), Mr. C. Mapp (Oldham East—Lab.), Mr. Ray Gunter (Southwark—Lab.), and Mr. T. Steele (Dumbarton East—Lab.) have tabled in the House of Commons this Motion:—That this House, being of opinion that exceptional hardship has resulted to British Railways Superannuitants, many of whom are not in receipt of National Insurance benefits, in a period of declining money values, calls upon Her Majesty's Government to bring forward proposals for the alleviation of this hardship.

The title of the Motion is: "British Railways Superannuation (Supplementary Pensions)."

## Warerite Murals in ss. Oriana

*One of the Warerite panels decorating the tourist class ballroom of ss. Oriana, the new P & O Orient Line passenger ship. The design is in black and white by Miss Olive Sullivan*

# Contracts and Tenders

*Plasser tamping equipment for British Railways*

Plasser Railway Machinery (G.B.) Limited has received the following orders :—

British Railways, London Midland Region : 14 Plasser-Theurer "Plassermatic" VKR-04 hydraulic combined levelling, lifting and tamping machines with spares and accessories.

British Railways, North Eastern Region : five Plasser-Theurer "Plassermatic" VKR-04 hydraulic combined levelling, lifting, and tamping machines with spares and accessories.

British Railways, Western Region, has placed the following contracts:

South Western Electricity Board, Mid-Cornwall District: supply, installation, testing, connecting, and setting to work of electric lighting facilities, at Lostwithiel Station, goods yard and goods shed

Charles Griffiths Limited: demolition of the booking office, and hall and other work at Ealing Broadway Station

Cowans Sheldon & Co. Ltd.: supply, delivery, and installation of three wagon turntables at No. 21 shop, carriage & Wagon Works, Swindon

M.L. Engineering (Plymouth) Limited: provision and installation of telephone train control equipment at Plymouth

Ericsson Telephones Limited: provision and installation of telephone train control equipment at Gloucester and Shrewsbury

Robert Powdrill & Co. Ltd.: carrying out repairs to the retaining wall in the goods yard at Stroud, to Stratford Viaduct, Stroud, and to the under-bridge at Stonehouse

Baileys (Bristol) Limited: stripping and renewal of the roofing of "ET" shop, locomotive works, Swindon

W. J. Furse & Co. (Manchester) Ltd.: supply, installation, testing, connecting, and setting to work of electric lighting facilities, at Lampeter Station

Standard Telephones & Cables Limited: provision and installation of 12 trunk telephone carrier circuits between Cardiff and Swansea

Stone & Co. (Bristol) Ltd.: reconstruction and widening of the overbridge at Lawrence Hill, Bristol

Clough, Smith & Co. Ltd.: supply, installation, testing, connecting, and setting to work of electric lighting facilities, at Cradley Heath Station and yard

Anglo-Scottish Construction Co. Ltd.: provision of a power signalbox, and of a small messroom at Slough

Industrial Building & Maintenance Limited: insulating and reproofing of the wagon repair depot and the construction of a small paint store at Cardiff Cathays Wagon Works

Willoughby (Plymouth) Limited: work to be performed in connection with the annual overhaul and survey of the ss. *Sir Richard Grenville*

Nott, Brodie & Co. Ltd.: carrying out repairs to the piers of the bridge under the line on the Gloucester Docks branch

W. J. Furse & Co. (Manchester) Ltd.: supply, installation, testing, connecting, and setting to work of electric lighting facilities at Bassaleg

F. J. Henry (Builders) Limited: conversion of an existing two-storey office and amenity building to provide new canteen facilities at South Lambeth Goods Depot, and carrying out alterations to the existing canteen on the first floor of the goods warehouse

Gilmours (Manchester) Limited: painting 27 underbridges between Bruton and Creech Junction in the Taunton District.

The Export Services Branch, Board of Trade, has received calls for tenders as follow :—

*From Victoria :*

12-channel carrier telephone system complete with associated apparatus.

The issuing authority is the Secretary for Victorian Railways, Melbourne, C.1, to whom bids should be sent. The tender No. is 61845. The closing date is February 15, 1961. The Board of Trade reference is ESB/31454/60.

*From Pakistan :*

1 balancing machine capable of balancing EMD D-19 traction motor and D-15 main generator armatures.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P6/C/102/60. The closing date is December 20, 1960. The Board of Trade reference is ESB/31386/60.

250 coupling screws high-tensile steel for carriage and wagon complete (BG) to I.R.S. drg. No. WA-1 and PRSS No. R-9-49.

The issuing authority is the Chief Controller of Stores, Eastern Bengal Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is P5/ACST/EBI/28/60. The closing date is January 4, 1961. The Board of Trade reference is ESB/31423/60.

*From Portuguese East Africa :*

18 fork-lift trucks.

The issuing authority is the Ports, Railways & Transport Department, Lourenco Marques, to whom bids should be sent. The tender No. is 4/61. A provisional deposit of Esc. 100,000 must be made by tenderers. Specifications are obtainable from the Railway Warehouse at Lourenco Marques, through the local agents of United Kingdom firms interested. The closing date is February 17, 1961. No further information about this call for tenders is available at the Board of Trade. The Board of Trade reference is ESB/30841/60.

1 railway sleeper removing machine.

The issuing authority is the Ports, Railways & Transport Department, Lourenco Marques, to whom bids should be sent. The tender No. is 12/61. A provisional deposit of Esc. 5,000 must be made by tenderers. Specifications are obtainable from the Railway Warehouse at Lourenco Marques through the local agents of United Kingdom firms interested. The closing date is January 25, 1961. No further information about this call for tenders is available in Export Services Branch. The Board of Trade reference is ESB/30847/60.

*From Formosa :*

1 double-action pump and ram, capacity 30 tons

8 sets of hydraulic jacks, capacity 20 tons

1 tyre heater, vacuum type tank, capacity 20 gal., wheels 18 in. dia., with rings to suit

1 d.c. arc welder and a.c. power combination powered by automatic diesel or petrol engine

1 centre lathe, Type 1S, motor 7·5 h.p., 450 mm. swing over bed, 1,250 mm. between centres

1 drilling machine, capacity 50 mm.

2 sets of electric hoists, low head type, maximum load 1,000 kgs.

2 sets of electric hoists, low head type, maximum load 2,000 kgs.

12 sets of expansion opening adjusters for 20-30 kg. rails

6 sets of track jacks, loading capacity, 5 tons.

The issuing authority is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Road, Taipei, Taiwan, to whom bids should be sent. The tender No. is CP4A-786. The closing date is December 23, 1960. The Board of Trade reference is ESB/31310/60/I.C.A.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

## Notes and News

**Locomotive Works to Close.**—Because of a decline in orders for locomotives, Metropolitan-Vickers—Beyer, Peacock Limited is to close its railway locomotive works at Stockton-on-Tees next February.

**Inquiry into London Public Transport Urged.**—A special inquiry into London public transport is being demanded by Conservative Members of the London County Council. A motion tabled by Sir Percy Rugg for the meeting of the Council on December 6 expresses the opinion that the Minister of Transport, Mr. Marples, should be asked to set up an inquiry as a matter of urgency. Sir Percy Rugg has stated that he wishes to see the independent inquiry established and reporting its findings before the summer of next year.

**Sir Arthur Kirby Visits Robert Stephenson & Hawthorns Limited.**—During a recent visit to Robert Stephenson & Hawthorns Limited, Darlington, a member of the English Electric group, Sir Arthur Kirby, Commissioner for East Africa, accompanied by Mr. H. J. H. Nethersole, General Manager of the English Electric Co. Ltd., Traction Division, and Mr. S. G. Dale, of the Export Department of the company, inspected a 1,840 h.p. diesel-electric locomotive made for East African Railways & Harbours by the English Electric Co. Ltd.

**London Midland Region Amateur Dramatic Society.**—On Thursday, Friday and Saturday of last week the Euston Players presented "Breath of Spring," a light comedy by Peter Coke, at the Rudolph Steiner Theatre, Park Road, N.W.1. The play is a light-hearted comedy about four respectable elderly ladies and an ex-Brigadier who form a syndicate and embark on a series of fur robberies, the proceeds of which are given to charities. It was well acted by a cast which included Miriam Ahern as Lily Thompson, the maid, who had spent some time in prison, and Rita Smith as Dame Beatrice Appleby, her mistress. Both these ladies have won awards as Best Actress at the London Midland Drama Festival ; Miriam Ahern, in 1960, and Rita Smith, in 1959. The part of the impeccable

ex-Brigadier was played by Jack Pegg, "Nan" by Hilda Pendrell, Alice Lady Miller by Peggy Kirby, and Hattie, a neurotic, by Joyce Cordery. The curtain goes down on this respectable gang planning more and better ways of making money, all for charity, of course. The play was produced by Beckie Sharp.

**Closure of West Ord Public Delivery Siding.**—British Railways, North Eastern Region, has announced that because of the loss which is being incurred, the public delivery siding at West Ord, on the Coldstream branch, will be closed on January 2, 1961. Approval for this measure has been given by the Transport Users' Consultative Committee for the North Eastern Area. Alternative facilities for full wagon load freight traffic are available at Velvet Hall public delivery siding.

**Cumberland and Westmorland Farmers Guests of Massey-Ferguson Limited at Smithfield Show.**—Massey-Ferguson (United Kingdom) Limited, arranged for a special British Railways, London Midland Region, train from Carlisle on December 4 to provide transport for over 240 Cumberland and Westmorland farmers and their families wishing to visit the Smithfield Show & Agricultural Machinery Exhibition at Earls Court, London. The party remained in London for two days and returned by special train from Euston Station on December 7.

**New Window Displays at Transad House.**—"Past and Present," is the theme of six new window displays just installed at Transad House, Leicester Square Station, headquarters of British Transport Advertising. Six major national advertisers are featured, one in each window. They have advertised continuously on transport sites for periods ranging from 27 to 63 years. Photographs are used to highlight examples of their past and present advertising displays. The displays were designed and installed for British Transport Advertising by London Press Exchange Limited, in conjunction with Publicity Arts Limited.

**Christmas Trees at Scottish Region Stations.**—Christmas trees are again being used to decorate the principal stations in Glasgow, Edinburgh, Dundee and Aberdeen, British Railways, Scottish Region, during December. The initial illumination of these displays took place at the following times and places: December 5, 11 a.m., Tay Bridge, Dundee; December 5, 4 p.m., Princes Street, Edinburgh; December 8, 3.30 p.m., Central Station, Glasgow; December 9, Aberdeen, 7.30 p.m. The displays were opened by the Hon. Lord Provost of Dundee, Mr. M. McManus; the Lord Provost of Edinburgh, Mr. J. Greig Dunbar; the Rt. Hon. Lord Provost of Glasgow, Mrs. J. Roberts; and Mr. B. J. Thomson; at Dundee, Edinburgh, Glasgow, and Aberdeen, respectively. Seasonable appeals were made on behalf of various charities.

*Part of an overbridge, one arch of which collapsed, closing the Bexleyheath-Dartford loop line, British Railways, Southern Region*

**Conversion of Railway into Road on the Welsh Border.**—An abandoned section of railway line between Dowlais Top and Beaufort, on the Welsh Border, is to be incorporated in the A.465, now being modernised, which extends from Hirwaun to Abergavenny. The original routes of the entirely new sections of the road were established before it was known that the Merthyr-Abergavenny railway line was to be abandoned. By building the Dowlais Top-Beaufort section of the modernised trunk road along part of the former railway for about six miles, the gradients and curves will be gentler and interference with private property will be reduced. Under the revised plan, the by-pass of Brynmawr will lead directly into the new road; Sirhowy and Dukestown will be bypassed; and there will be links connecting the new trunk road to the Ebbw Vale, Tredegar and Rhymney Valleys. The change of line will not involve any delay in carrying out the scheme.

**Collapse of Bridge in Southern Region.**—As recorded in last week's issue, part of a road bridge over the British Railways, Southern Region, track at Brockley, was found to be unsound and collapsed. The accompanying illustration shows debris close to the Bexleyheath-Dartford loop line.

**British Waterways Increase in Tolls and Charges.**—British Waterways has announced that it is to increase its tolls and charges as soon as possible to obtain an overall additional revenue of 10 per cent. Since the last general increase in August, 1957, costs, particularly wages, have risen considerably. In common with other transport undertakings British Waterways is now faced with new and substantial wage and salary awards which it cannot absorb and it is therefore reluctantly compelled to increase its tolls and charges.

**B.T.C. Public Relations Reception at Charing Cross Hotel.**—Mr. J. H. Brebner, Public Relations Adviser, British Transport Commission, welcomed London advertising agents to a reception held in the Charing Cross Hotel on November 30 on the occasion of the first showing of the 10-minute colour filmstrip, "Let's Look at British Transport Advertising." Mr. E. A. R. Puplett, Managing Director of Poster Services Limited, replied to Mr. Brebner's introductory remarks.

*One of six new window displays at Transad House*

**British Standard for Materials-Handling Pallets.**—The British Standard (B.S.2629 : 1960) for pallets for materials handling was first published in 1955 to establish a series of pallet sizes and capacities for through transit which were acceptable to transport organisations and convenient for transport and storage within individual organisations. The aim was to ensure that palletised unit loads could be moved from manufacturer to consumer with the minimum of handling and by as wide a range as possible of handling equipment. The standard has now been revised and the new edition gives full recognition to the work on palletisation carried out by the International Organisation for Standardisation (I.S.O.). The three sizes of small flat pallets considered by I.S.O. to be suitable

*Mr. G. J. Harris, left, receiving parting gift from Mr. David Blee*

for international trade have been adopted as British Standard sizes. Two other sizes of flat pallets have been included : the 40 in. x 40 in., which is considered one of the most suitable sizes for transport in standard railway vehicles in the United Kingdom, and the 36 in. x 48 in., which has been introduced at the request of the refractory products industry and the steel industry. Copies of the standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 6s.

**Winston Electronics Limited Marketing Agreement.**—Winston Electronics Limited, Waring Products Division, Shepperton, Middlesex, has, under its agreement with the Dynamics Corporation of America, become the sole marketing agent, and later the British manufacturers, of the Waring series of blenders or mixers.

**Export Council for Europe.**—Sir Graham Larmor, Managing Director of The Ulster Weaving Co. Ltd. of Belfast, and Mr. H. G. Lazell, Chairman & Managing Director of the Beecham Group Limited, of London, have accepted invitations from Sir William McFadzean to become members of the Export Council for Europe.

**Morgan Crucible Co. Ltd. at the Physical Society Exhibition.**—The exhibits displayed on the Morgan Crucible Co. Ltd. stand at the Physical Society Exhibition to be held at the Royal Horticultural Society Hall, Westminster, from January 16 to 20, 1961, illustrate some of the techniques and materials developed by the Morgan Crucible group. The instruments exhibited have been constructed for internal research purposes only, but the materials and devices shown can be supplied in commercial or experimental quantities. High temperature thermocouples, "Crusilite" concentrated source heating elements, and Morganohm grade 9 non-linear resistors will be demonstrated.

**Retirement of Mr. G. J. Harris.**—The accompanying illustration shows Mr. G. J. Harris, left, Regional Accountant, British Railways, London Midland Region, receiving from Mr. David Blee, General Manager, a parting gift to mark the occasion of his retirement, recorded in our personal columns, after 45 years' service. The silver tray bears an inscription from his colleagues of the senior officers' mess at Euston.

**Wandleside Exhibits at A.S.E.E. Exhibition, London.**—In its display of cables for railway service to be shown at the exhibition of the Association of Supervising Electrical Engineers at Earls Court, London, next March, Wandleside Cable Works Limited focuses attention mainly on a range of lead-coated Corrusteel armoured cables for connection to track-control apparatus, point machines, impedance bonds, and track circuit feeds. The Spinner Wire Catenary Cable for overhead suspension on poles used for automatic warning signal and control circuits will also be shown.

**New Belgian Car-ferry for Dover-Ostend Line.**—A new car-ferry, the *Roi Baudouin*, is to be put into service between Dover and Ostend by Belgian Railways & Marine in 1962. The vessel will be very similar to the *Artevelde*. Passenger capacity will be in the region of 900, and there will be space for 160 cars distributed on two decks. Between 1950 and 1957 the Dover-Ostend motor traffic rose from 15,945 to 37,953 vehicles a year.

**Canadian Railway Strike Called Off.**—The Canadian railway strike which was due to start on December 3, was called off on December 2, after a Bill to stop it was passed by the House of Commons and the Senate. The Bill continues existing employer-trade union agreements and postpones until May 15 next any further action in the dispute over wages. Soon after the Bill had been passed Mr. Hall, leader of the Railway Employees' Union, announced that the strike had been called-off and that all railway workers must remain in service.

**Althorne Station Closed to Freight Traffic.**—British Railways, Eastern Region, has announced that on December 19, 1960, the freight train service will be withdrawn from Althorne Station, situated on the Wickford-Southminster branch line. Collection and delivery services for freight sundries traffic will continue to operate in the area. Freight in full wagon loads will be dealt with at Burnham-on-Crouch and Southminster Stations.

**New Power Sweeper on Trial at Waterloo.**—The new power sweeper which British Railways, Southern Region, has on trial at Waterloo Station, promises to overcome the litter problem which has been the cause of so much comment from Continental visitors. The machine, the Stokvis-Tennant power sweeper, was made in Holland. It picks up fine dust and bulky litter in one

*Power sweeper being tested at Waterloo Station*

operation. The machine is powered by a 9·2 h.p. petrol engine, and with a sweeping width of 53 ins. it can sweep up to 90,000 sq. ft. per hr. at speeds up to 5 m.p.h. It is claimed that anyone can drive the sweeper after only a 10 min. lesson.

## Railway Stock Market

The recent sharp decline in stock markets was followed by steadier conditions, but a good deal of uncertainty continued, though selling was much less in evidence. Buyers were following a waiting attitude until the future of the dollar and the policy of the new U.S. president should become clearer and remove much of the uncertainty surrounding markets.

Antofagasta ordinary stock, which were still under the influence of the resumption of dividends with 2 per cent, remained the outstanding feature in foreign rails, with a further rise on balance from 16½ to 18. The preference stock strengthened afresh from 34½ to 35 and the 4 per cent perpetual debentures were again 49½.

Business around 53 was recorded in Chilean Northern first debentures. Costa Rica ordinary stock kept at 35½, while in other directions, Guayaquil & Quito assented bonds have changed hands at 62. Brazil Rail bonds eased to 5, San Paulo Railway 3s. units were again 1s. and United of Havana second income stock 6, while elsewhere Mexican Central "A" bearer debentures eased and then held firm at 60. International of Central America shares remained at $25.

Canadian Pacifics have rallied from $37 a week ago to $38⅞, though the 4 per cent preference stock receded from 59 to 58½ and the 4 per cent debentures from 61½ to 60⅜. White Pass shares came back from $10⅜ to $10⅛.

Business up to 10s. was recorded in Nyasaland Railways shares, and at 38 in the 3½ per cent debentures. West of India Portuguese capital stock was again quoted at 110½.

Fears of a Government slow-down in railway modernisation plans affected sentiment in regard to shares of locomotive building, engineering and kindred companies, which were also, of course, influenced by the general trend in stock markets. Beyer Peacock 5s. shares came back afresh from 6s. 6d. a week ago to 6s. 3d., while Charles Roberts 5s. shares declined further from 9s. to 8s. 6d., and there was a reaction from 19s. 6d. to 18s. 6d. in Wagon Repairs 5s. shares.

Gloucester Wagon 10s. shares declined slightly from 10s. 3d. to 9s. 10½d. G. D. Peters have changed hands up to the better level of 16s. 6d., but Westinghouse Brake fell back from 41s. 4½d. to 40s., Birmingham Wagon lost 6d. at 29s. 6d. and North British Locomotive shares were somewhat easier at 6s. 9d.

Pressed Steel 5s. shares came back to 27s. 9d. and Dowty Group 10s. shares to 33s. 6d., but Broom & Wade 5s. shares, which have remained under the influence of the good results, were again 22s. Ransome & Marles 5s. shares eased to 23s. 9d., Pollard Bearing 4s. shares to 30s. 9d., Ruston & Hornsby have been steadier at 25s. and Stone-Platt remained at the rather lower level of 55s. Mather & Platt receded to 43s. 6d. and A.E.I. to 41s. 3d. at which there is now a generous yield of over 7 per cent. English Electric also lost some ground, to 32s. 6d. and yield fully 6 per cent. G.E.C. after falling on news that the idea of a merger with English Electric is to be dropped, rallied, but later came back again to 30s. 9d. Yield on the latter is over 6¾ per cent. There are divergent views in the City as to whether G.E.C. is likely to get a take-over or merger offer from another source. Steel shares have been inclined to attract more attention in response to higher dividend hopes, but there was some selling of Guest Keen, which have receded to 77s. 6d. "ex" rights to the new shares. British Oxygen 5s. units at 26s. lost a few pence as compared with a week ago, but T. W. Ward, after a decline, rallied to 65s. 6d.

## Forthcoming Meetings

December 12 (*Mon.*).—The Permanent Way Institution, London Section, at Headquarters, British Transport Commission, London, N.W.1, at 6.30 p.m. Illustrated paper "Handling & Maintenance of Long Welded Rails," Mr. H. C. Trissler.

December 12 (*Mon.*).—The Institute of Transport, at 66, Portland Place, London, W.1, at 5.45 p.m. Henry Spurrier Memorial Lecture—"The Impact of the Motor Car on Public Transport," Mr. J. M. A. Smith.

December 12 (*Mon.*).—The Railway Club, at club rooms, 320 High Holborn, London, W.C.1, at 7 p.m. Informal meeting. Display of colour slides by members.

December 13 (*Tue.*).—Industrial Transport Association, at the lecture theatre, Royal Society of Arts, John Adam Street, London, W.C.2, at 6.30 p.m. "Morale in Management," Mr. J. Marsh.

December 14 (*Wed.*).—Institution of Railway Signal Engineers, York Branch, at the Signalling School, Toft Green, York, at 5.30 p.m. "The Modernisation Plan and its Challenge to the Signal Engineer," Mr. A. F. Wigram.

December 14 (*Wed.*).—The Institution of Mechanical Engineers, at 1, Birdcage Walk, London, S.W.1, at 6 p.m. "Machine Tool Research, Design and Utilisation," Dr. D. F. Galloway.

December 14 (*Wed.*).—British Railways, Southern Region, Lecture & Debating Society, at the Chapter House, St. Thomas' Street, London, S.E.1, at 6 p.m. "Moscow Journey," Mr. W. J. A. Sykes.

December 15 (*Thu.*).—British Railways Western Region, Lecture & Debating Society, at Headquarters Staff Dining Club, Paddington, at 5.45 p.m. "The Means by which Morale on British Railways can be Enhanced;" young men's discussion.

December 15 (*Thu.*).—Diesel Engineers & Users' Association, at the Institute of Marine Engineers, Mark Lane, London, E.C.3, at 2.30 p.m. "Report on Diesel Engine Working Costs and Performance, 1959-60.

## OFFICIAL NOTICES

**FIBREGLASS** laminates. May we quote to your enquiries? Brochure on request—Resinform Ltd., Withington Road, Manchester, 16. Phone.: Moss-Side 1306.

**MANUFACTURER** of accessories for Railway Rolling Stock and Locomotives, has vacancy in Sales Organisation for Engineer with experience on Railway or with the trade. Applicants should be under 30 years of age and have good educational qualifications. Write Box 97, *The Railway Gazette*, 33, Tothill Street, S.W.1, giving relevant details of qualifications and career to date.

**RAILWAY ELECTRIFICATION**

**TENDER for switching stations and booster transformer stations for railway electrification on the 25-kV. 50-cycle, single phase system on the Sealdah-Ranaghat and Dum Dum-Bongaon sections of the Eastern Railway.**

1. The General Manager & Chief Engineer, Railway Electrification (Ministry of Railways, Government of India), invites tenders from competent and experienced contractors for supply, erection, testing and commissioning of equipment for the switching stations for the sections Sealdah-Naihati-Ranaghat and Dum Dum Jn.-Bongaon and booster transformer stations for the section Sealdah-Naihati of the Eastern Railway.

2. Tender Papers containing Instructions to Tenderers, Conditions of Tendering, Conditions of Contract and Specifications may be purchased from the office of the General Manager and Chief Engineer, Railway Electrification, 235, Lower Circular Road, Calcutta-20 on and from November 28, 1960, on payment of Rs. 100.00 (£7 10s.) per copy which shall be deposited in cash with the Cashier, Railway Electrification, 232, Lower Circular Road, Calcutta-20, or sent by money order to the above-named official.

3. Tenders shall be submitted in seven copies in accordance with the instructions given in the Tender Papers. Six copies of the tender shall be submitted to the office of the General Manager & Chief Engineer, Railway Electrification at or before 3 p.m. I.S.T. on February 28, 1961. The seventh copy of the tender shall be submitted to the Societe Nationale des Chemis de fer Francais, 42, Rue de Chateaudum, Paris IX, at or before 10.30 a.m. Paris time, on February 28, 1961.

4. The earnest money to be deposited for each tender is rupees twenty thousand (£1,500). A Security deposit of rupees one lakh (£7,500) will have to be made by the successful Tenderer on placing of the order. All relevant particulars are available in the Tender Papers, but any clarification required will be given by the General Manager & Chief Engineer, Railway Electrification.

5. Tenders will be opened at 3.30 p.m. on February 28, 1961, in the presence of Tenderers, if any, at the office of the General Manager & Chief Engineer, Railway Electrification. Tenders submitted to S.N.C.F./Paris, will be opened at 11.00 Paris time on the same day.

6. On no account will the last date of tendering be extended.

GENERAL MANAGER & CHIEF ENGINEER

Foreign Employment

**ROADMASTER**

**ENGINEERING GRADUATE** preferred; minimum of two years engineering training essential.

Require two years varied railroad engineering service, or five years in direct charge of track crews. Will supervise 135 men maintaining 45-mile railroad assign work, order materials, be responsible for safety, make regular detailed inspections of roadbed and all track on main line, sidings and yards, bridges, tunnels, etc. Will make engineering calculations relating to maintenance and use of structure and equipment. Must speak Spanish. Married or single candidates acceptable.

Excellent opportunity large copper company, Chile, South America. Two year contract with transportation both ways for you and family. Basic salary $525.00 to $650.00 per month depending upon age and experience of applicant.

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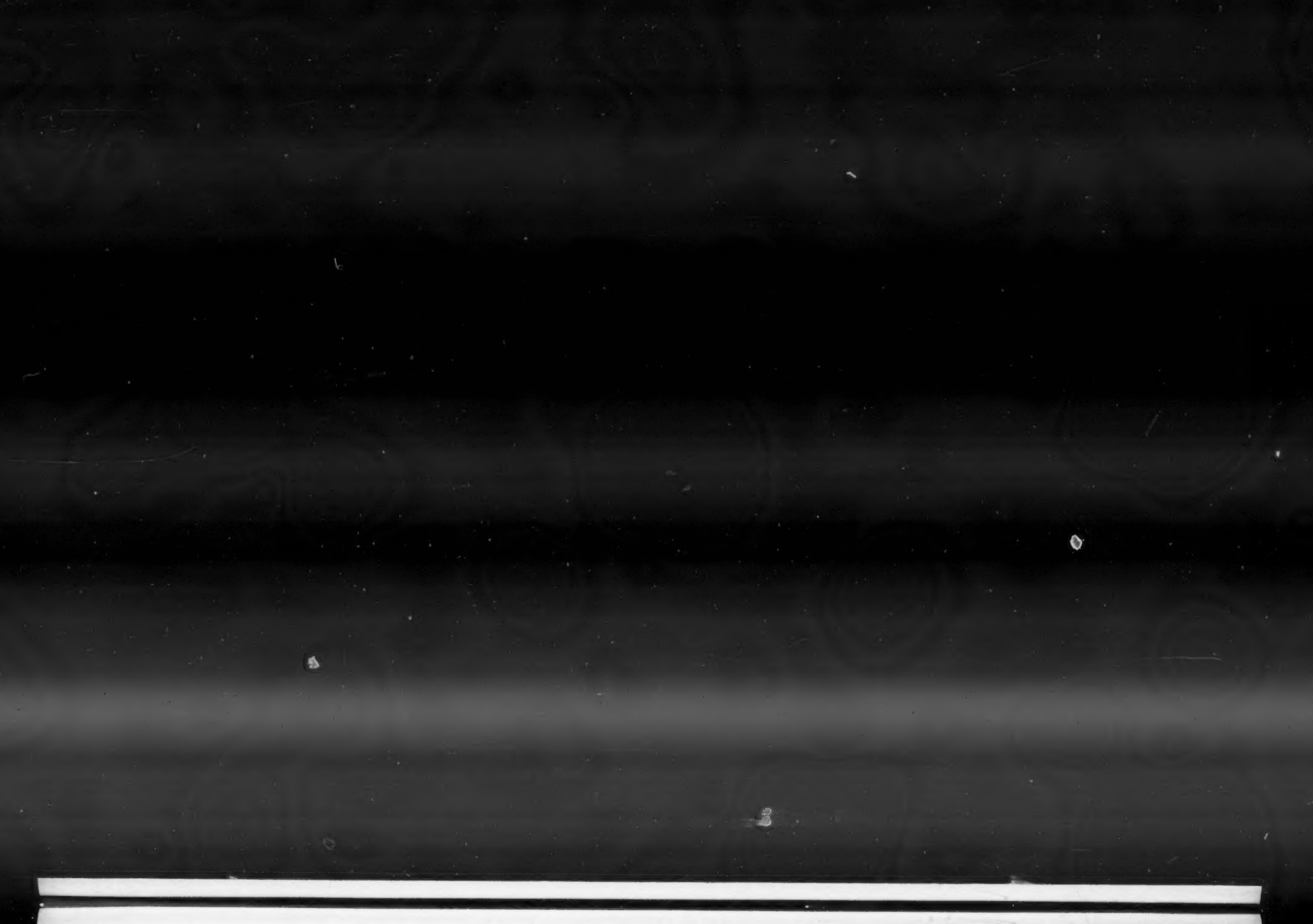
**REQUIRED** for the Central Railway of Peru. Assistant Engineer (Civil). Capable of designing steel bridge work, simple reinforced concrete structures and alterations to existing steel structures, of field work in connection with new projects and supervision of construction. Must be Chartered Civil or Structural Engineer with at least 5 years' experience in position of responsibility covering both design office and field work. Railway experience and knowledge of Spanish advantageous but not essential. Age 30/40 preferably single. Terms of the appointment are (*a*) for three years only, (*b*) £1,600 per annum which together with special rate of exchange is equivalent to approximately £2,200, (*c*) payment of indemnity after three years at a rate of 1 month's salary for each year of service. Please apply in writing to the Peruvian Transport Purchasing Company Limited, Suffolk House, 5, Laurence Pountney Hill, Cannon Street, London, E.C.4.

**REQUIRED FOR THE SOUTHERN RAILWAY OF PERU.** Diesel Engineer (Operation). Must have served a full apprenticeship in an engineering workshop (preferably locomotive) and had at least two years subsequent experience as an administrative and technical officer on Diesel Electric Locomotive manufacture or maintenance. Should have a technical education up to the National Certificate standard in mechanical engineering. Must be fit and able to travel at an altitude up to 16,000 ft. Salary offered £1,600 per annum, plus special conversion rate. Please apply in writing to: Peruvian Transport Purchasing Company Limited, Suffolk House, 5, Laurence Pountney Hill, Cannon Street, London, E.C.4.